G. B. C.

CALENDAR

1970-1971

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General
Information

The George Brown College of Applied Arts and Technology

The George Brown College
# of Applied Arts and Technology

P.O. Box 1015, Station B
Toronto 2B, Ontario
Telephone 362-3971

Learn to Be Useful

To be useful and to be needed, both by society and by people, is fundamental to one's individual freedom, personal security and happiness.

C. C. *Lloyd*

Board of Governors

Maria Brodzki

Alderman Horace Brown
Toronto City Council

Alderman Hugh Bruce
Toronto City Council

Alderman Archie Chisholm
Toronto City Council

Alderman David E. Crombie
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Dalton Engineering and
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University of Toronto

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General Manager of Operations,
Toronto Transit Commission

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Gordon, Keyfetz, Hall, Baker
and Goodman, Barristers

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President,
George Brown College

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Director of Education and Welfare,
United Steelworkers of America, Toronto

S. A. Norton
Administrator,
Technical Centres,
Applied Arts and Technology Branch,
Ontario Department of Education

The College

History and Government

The George Brown College of Applied Arts and Technology is one of Twenty Community Colleges in Ontario established by the Ontario Government. The College was formed in 1967 by the merging of two famous trade schools–The Provincial Institute of Trades and Occupations and the Provincial Institute of Trades. Governing responsibility rests in the hands of a twelve-man Board of Governors.

As the Toronto-area Community College, it is a multi-purpose institution offering certificate and diploma programs in technical, applied arts, and business fields.

The Campus

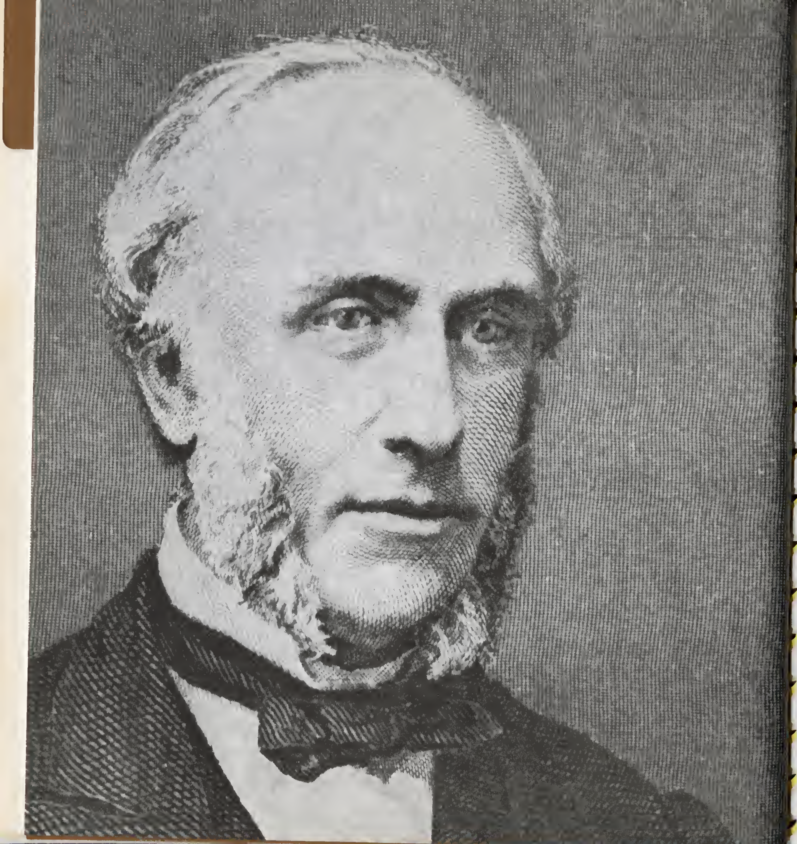
The College has, at the present time, six campuses. Changes in each campus are continually in progress to keep up with the rapid increase in student enrollments.

The Library

A library is located on each campus. Each library provides a selection of texts, periodicals, and materials related to the courses offered on that particular campus, as well as books and magazines for browsing.

Library hours on each campus are
Monday-Thursday: 8.00 a.m. to 10.00 p.m.
Friday: 8.00 a.m. to 6.00 p.m.

Students are invited to use the library facilities at any time during these hours for reference, borrowing, studying or relaxation.



George Brown/1818-1880

Statesman–Politician–Journalist–Father of Confederation

Son of Peter Brown, an Edinburgh merchant, and Isabella Mackenzie, George Brown was born forty miles up the Forth at Alloa, November 29th, 1818. He grew up in the Citadel of Scottish Education and within the High School and Southern Academy of Edinburgh.

At the age of twenty, George Brown migrated, with his father Peter Brown, to New York where, in 1842, they established the British Chronicle, a journal for British emigrants. In 1843, the Browns moved to Toronto where they launched the Banner (1843-1848), a Free Church Presbyterian weekly. In 1844 Brown founded the Globe as a weekly, and in 1853, it became a daily.

George Brown was a man of deep convictions. Under his forceful editorship the Globe became a leader of political and educational enterprise. This was manifest when the Globe, in 1853, having absorbed its two main reform rivals, became a daily which acquired an influence unequalled by any Canadian journal since that day.

Through the pages of the Globe, and the spell of his forthrightness, George Brown dominated the Liberal Party for over two decades.

George Brown opposed all church-affiliated schools. He advocated representation by population, to give large population groups in western Canada their proper place in the Assembly. He ardently advocated the annexation of Hudson's Bay lands. His hastily reorganized Reform Party, which swept the western polls in 1857, was in 1858 put out of power after Brown had ruled two days as Premier of the province.

1864 led George Brown to bold statesmanship when he agreed to enter a coalition government with his Conservative rivals and the day he rose and walked forward to meet Sir John A. Macdonald in the Assembly he made possible the birth of Confederation.

Naturally, strong individualists could not always see eye to eye, and it was a distinct loss when he resigned from the government in 1865. However, he still ardently worked for and supported Confederation until its consummation. Sir John A. Macdonald, political giant that he was, so weakened Brown's leadership by taking able Liberals into his cabinet that in the elections of Confederation year 1867, George Brown was defeated.

George Brown withdrew from active politics, but exercised his editorial power through the leadership given in the pages of the Globe. In 1873, Alexander Mackenzie appointed him to the Senate where his influence was cut short in his sixty-second year by a bullet fired by a disgruntled employee. May 8th, 1880, was coronation day for a great Scot, a commanding journalist, an ardent politician, and a Founding Father.

The George Brown College is dedicated to the principles enunciated by this great man. Human dignity is founded not only upon political freedom but also on the development of skills and knowledge that allow one to make a significant contribution to the well-being of the community.

Calendar/1970

September

S		6	13	20	27
M		7	14	21	28
T	1	8	15	22	29
W	2	9	16	23	30
T	3	10	17	24	
F	4	11	18	25	
S	5	12	19	26	

October

S		4	11	18	25
M		5	12	19	26
T		6	13	20	27
W		7	14	21	28
T	1	8	15	22	29
F	2	9	16	23	30
S	3	10	17	24	31

November

S	1	8	15	22	29
M	2	9	16	23	30
T	3	10	17	24	
W	4	11	18	25	
T	5	12	19	26	
F	6	13	20	27	
S	7	14	21	28	

December

S		6	13	20	27
M		7	14	21	28
T	1	8	15	22	29
W	2	9	16	23	30
T	3	10	17	24	31
F	4	11	18	25	
S	5	12	19	26	

Calendar/1971

January

S		3	10	17	24	31
M		4	11	18	25	
T		5	12	19	26	
W		6	13	20	27	
T		7	14	21	28	
F	1	8	15	22	29	
S	2	9	16	23	30	

February

S		7	14	21	28
M	1	8	15	22	
T	2	9	16	23	
W	3	10	17	24	
T	4	11	18	25	
F	5	12	19	26	
S	6	13	20	27	

March

S		7	14	21	28
M	1	8	15	22	29
T	2	9	16	23	30
W	3	10	17	24	31
T	4	11	18	25	
F	5	12	19	26	
S	6	13	20	27	

April

S		4	11	18	25
M		5	12	19	26
T		6	13	20	27
W		7	14	21	28
T	1	8	15	22	29
F	2	9	16	23	30
S	3	10	17	24	

May

S		2	9	16	23	30
M		3	10	17	24	31
T		4	11	18	25	
W		5	12	19	26	
T		6	13	20	27	
F		7	14	21	28	
S	1	8	15	22	29	

June

S		6	13	20	27
M		7	14	21	28
T	1	8	15	22	29
W	2	9	16	23	30
T	3	10	17	24	
F	4	11	18	25	
S	5	12	19	26	

July

S		4	11	18	25
M		5	12	19	26
T		6	13	20	27
W		7	14	21	28
T	1	8	15	22	29
F	2	9	16	23	30
S	3	10	17	24	31

August

S	1	8	15	22	29
M	2	9	16	23	30
T	3	10	17	24	31
W	4	11	18	25	
T	5	12	19	26	
F	6	13	20	27	
S	7	14	21	28	

Calendar/1971 – *continued*

September

S		5	12	19	26
M		6	13	20	27
T		7	14	21	28
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November

S		7	14	21	28
M	1	8	15	22	29
T	2	9	16	23	30
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F	5	12	19	26	
S	6	13	20	27	

December

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T		7	14	21	28
W	1	8	15	22	29
T	2	9	16	23	30
F	3	10	17	24	31
S	4	11	18	25	

Calendar/1972

January

S		2	9	16	23	30
M		3	10	17	24	31
T		4	11	18	25	
W		5	12	19	26	
T		6	13	20	27	
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The Student

Admission Requirements
Applied Arts, Business and Technician Programs

i) Programs two years or longer in length
The Ontario Secondary Graduation Diploma with related options awarded after successful completion of any four- or five-year program.

ii) Programs one year or shorter in length
a) As stated in the course description.
b) The Ontario Department of Education Statement of Standing awarded after the successful completion of Grade 10 of any Four-Year Program, or as noted. Many of the programs in this category are available under the Ontario Manpower Retraining Program, a government-subsidized educational program for adults. Programs so available are coded with the OMRP Program numbers. Application for programs under the OMRP can only be made through the nearest Canada Manpower Centre.

iii) Admission as a mature student
Persons of 19 years and over who do not meet the admission requirements, but who appear to have the capacity and maturity to succeed in the College, will be admitted to an appropriate program as probationary students.

iv) Admission with advanced standing
The College grants advanced standing for college-level study completed at other accredited institutions. Students contemplating transfer are urged to study carefully the programs in this calendar to determine the relevance of their present course work to the program desired. A student must be in good standing at the last institution attended to be eligible for admission.

Apprenticeship Programs
Under an agreement between the Industrial Training Branch of the Department of Labour and the College, apprenticeship programs are offered for Registered Apprentices only. For general information, consult the section Apprenticeship Courses.

Admission Procedure
Application forms may be obtained from your Secondary School Guidance Office or from the George Brown College, P.O. Box 1015, Station B, Toronto 2B, Ontario. Application forms must be accompanied by one of the following documents:

i) An official transcript of all secondary school marks, showing the necessary credits and grades for admittance to the desired program, or

ii) A statement from the Secondary School Principal stating that the applicant is expected to obtain the necessary credits and grades for admittance to the desired program. This statement must be substantiated by an official transcript of marks when it becomes available.

All applications are reviewed by the Board of Admission which is empowered to defer, reject or recommend an alternate program for any candidate whose qualifications in the opinion of the Board are not adequate to the demands of the program which the candidate wished to pursue.

Probationary Status
Students who have been accepted but do not meet the published prerequisites for a program, and students who are re-admitted after a failure (a grade-point average less than 2.0) are placed in probationary status. If a probationary student has not achieved a 2.0 grade-point average by the end of the semester, he will be required to withdraw. For more detailed information contact the admitting Campus Registrar.

Transfer Credits
Students who wish to have courses taken elsewhere credited to the program in which they wish to enrol must apply in writing to the admitting Campus Registrar at or before the end of the first week of their course. Their work will be evaluated and credited to their program where applicable.

Equivalent Standing
Applicants from another Province or country are required to submit evidence of equivalent standing. The following certificates are recognized as being equivalent to the Ontario Secondary School Graduation Diploma, and may be accepted if the applicants meet the other admission requirements:

Alberta/Junior Matriculation (Grade 11)
British Columbia/Junior Matriculation (Grade 12)
Manitoba/Grade 11
New Brunswick/Junior Matriculation (Grade 12)
Newfoundland/Grade 11
Nova Scotia/Junior Matriculation (Grade 11)
Prince Edward Island/First Class License or Second Year Certificate of Prince of Wales College
Quebec/Quebec High School Leaving or McGill Junior Matriculation
Saskatchewan/Grade 11

Registration Dates
Consult the College Admissions Information Brochure.

A student is not considered duly registered and will not be admitted to classes until all fees are paid in full.
Additional programs will be offered at various times throughout the school year. Starting dates are available upon request.
Programs will be given only if enrolment is sufficient.

The Student Administrative Council
All students of the College are members of the S.A.C.

Its purpose is to unite the students within a functioning body, which provides opportunity for the formulation, expression and extension of student ideas.

The S.A.C. endeavours to co-ordinate all phases of co-curricular activity other than the field of Athletics. The S.A.C. represents the Student Body at College functions, and on public occasions. Through its Standing Committees, it organizes such inter-school and College activities as may be of interest to the Student Body as a whole.

The affairs of the S.A.C. are administered by an elected executive. The following clubs and committees come under the jurisdiction of the S.A.C.:

1. The College hockey team–a competing member of the Toronto Inter-College Hockey League and the O.C.A.A. (Ontario College Athletic Association).
2. The Camera Club.
3. The Seathan Year Book and Globe Student Newspaper.
4. Social Committee.

Athletics
The opportunity is provided for every member of the Student Body to participate in the Athletic Program.

The Athletic Director operates a highly developed plan for Inter-House League Sports. Ice Hockey, Table Tennis, Chess, Volleyball, Basketball, Badminton and Floor Hockey are areas of interest.

The George Brown College is a member of the O.C.A.A. This College has competent teams entered in the Volleyball, Basketball, and Ice Hockey areas.

Intramural Sports
The Intramural Program is run by the Athletic Association consisting of a President, Vice-President, Secretary, Treasurer and one representative from each Campus. The Program includes volleyball, basketball, floor and ice-hockey, badminton and table tennis.

Minor Athletic Clubs
Clubs for any Athletic activity may be organized by calling a meeting of interested students, electing officers, and submitting a constitution to the Athletic Director for approval.

Regulations
1. The College does not accept responsibility for injuries sustained by Students taking part in Intramural or College sports. Students should see that they are insured with O.H.S.I.P. and O.H.S.C. to cover doctor's services and hospitalization. First aid treatment only is provided at the College Health Centre.

2. Students who plan to participate in Athletics should note carefully the following excerpts from the "Regulations Governing Discipline" and from the Constitution of the Athletic Association:

a) No one shall be allowed to represent The George Brown College of Applied Arts and Technology in any public Athletic contest, either individually or as a member of any team, unless he is a member of the Association.

b) The Director shall have full control of the use of the College's name by athletic clubs, and no schedule of matches, races, or athletic games, arranged by a College Club, shall take effect until approved by the Athletic Director.

c) The Director shall have control and direction of any facilities connected with athletics, and shall make such rules and regulations as are deemed necessary for their management. The Director shall give priority to such arrangements as may be necessary to effect the carrying out of the College regulations requiring physical training.

d) The Director shall have absolute power to suspend anyone from the privileges of the Athletic Association and also from the right to take part in College Athletics, for any breach of the regulations.

Health Services
The Health Service program has been planned to help students and personnel achieve and maintain a high level of health and efficiency. Each Campus has a Health Centre, staffed by registered nurses with a physician available for consultation on an appointment basis.

Services offered include: health counselling; health education programs; emergency care of accidents and illness; supportive care following minor injuries and illness; referrals to medical facilities, Campus counselling services or to community agencies to provide help for an individual; immunization to protect against tetanus, poliomyelitis and smallpox.

All students are strongly advised to arrange their own coverage under Ontario Health Services Insurance Plan and Ontario Hospital Insurance Plan or be prepared to accept the responsibility to pay all medical and hospital costs resulting from illness or accident. Application forms and information regarding these plans as well as application forms for help to pay Ontario Health Services Insurance premiums are available at all Health Centres. Any student may arrange for coverage under private plans until eligible for these government plans.

All students will be requested to complete a health history form on arrival at George Brown College. Certain courses may request a complete medical examination before a student is accepted.

Free chest Xray facilities are provided by the Toronto Chest Clinic for students who have not had a recent chest Xray or tuberculin test. Forms and information are available in the Health Centres.

Mutual Responsibility Agreement
The acceptance of a student at The George Brown College of Applied Arts and Technology constitutes an agreement of mutual responsibility. The student's part of the agreement is to accept established college rules and practices, to respect the laws of the city and province, and to act in a responsible manner appropriate to these laws, rules and practices. The college's part is to provide an environment that encourages student growth and development. The college recognizes that the great majority of students accept and fulfil their parts of the agreement. Disciplining action on the part of the college must be taken when a student is persistently irresponsible.

Finances

Fees
Tuition fees for one full academic year (2 semesters):
$175.00 (this includes tuition fees, student activity fees and insurance. $10.00 administrative fees are non-refundable.)

Tuition fees for one-semester courses:
$87.00 (this includes tuition fees, student activity fees and insurance. $10.00 administrative fees are non-refundable.)
Tuition fees represent only a small fraction of the total costs of providing post-secondary education through the college, the balance being provided from public funds.

Note: Shorter programs will be calculated on a pro rata basis. Fees are payable to The George Brown College of Applied Arts and Technology.

Refund Schedule
Full refund of tuition fees will be granted if requested by letter and submitted to the Registrar's office prior to the 6th day of instruction.

One-half of tuition fees will be granted if requested by letter and submitted to the Registrar's office prior to the 41st day of instruction.

No refund will be granted after the 40th day of instruction. Refunds for shorter programs will be calculated on a pro-rata basis.

Additional Expenditures
i) Textbooks, instruments, and supplies should be purchased by the student as soon after registration as possible. The cost of such items varies, according to the course, from forty dollars to one hundred dollars. Students are invited to use the facilities of the College Bookstore.

ii) Although uniforms and equipment are supplied to the members of the College teams, such students must be prepared to pay for the incidental expenses incurred on the trips for out-of-town games.

iii) Students who wish to retain projects constructed in the College must pay for the materials.

Living Accommodation

Residence accommodation for out-of-town students is not provided by the College. The Student Administrative Council maintains a list of boarding and rooming facilities in Toronto. Students are given every possible assistance in finding the type of accommodation suitable to their needs. The classified advertising columns of the daily newspapers are also recommended as an excellent source of information.

Rates vary from $20.00 to $30.00 per week for room and two meals. The College operates cafeterias at all campuses.

Transportation
Reduced fares on the "Go" train are available through the office of the Student Affairs Administrator and students are encouraged to commute by train, T.T.C. and subway whenever possible.

Counselling Services

33 Bloor Street East, Tel.: 924-4415

The following services are provided:

Orientation Program
Applicants referred by Canada Manpower are received at the Counselling Centre for an Orientation program consisting of testing, counselling, health interviews and, when indicated, a review of mathematics and English. Negotiations are carried out with Canada Manpower for reallocation of applicants whose initial course allocation proves unsuitable. Accepted applicants are then transferred to the appropriate campus. This service is also available to applicants sponsored by agencies other than Canada Manpower and may be arranged by contacting the Counselling Centre or Campus Registrars.

On-campus Counselling
Counsellors have been assigned to each campus of the College to work out solutions to any personal problems. Discussions are informal and confidential and do not form part of any official college records.

Information Centre
This service provides assistance to persons wishing to register for courses at the George Brown College. Enquiries may be made by telephone or in person to 33 Bloor Street East (Telephone 924-4415). The Centre will provide information and will give or mail out descriptive literature and registration forms to callers.

Community Counselling
This is a comprehensive counselling service open to the general public. A staff of experienced counsellors is available to advise on educational and vocational matters and to assist in career planning. Testing is carried out on a group or individual basis.

Financial Assistance

Ontario Student Awards Program
The applicant must be a Canadian citizen or have landed immigrant status and have resided in Canada for a period of at least 12 consecutive months. In addition:

a) The parents of dependent students must be permanent residents of Ontario.

b) An independent student who is a Canadian citizen or a landed immigrant must have been a permanent resident of Ontario for at least 12 consecutive months immediately prior to first enrolling in the academic program for which he is requesting financial assistance.

The Ontario Student Awards Program has been developed to ensure that every person with the ability and desire to pursue a program of education beyond the secondary school level will have sufficient funds to meet the costs of such an undertaking. While it is felt that, in the first instance, the responsibility for providing the necessary funds rests with the parent (guardian or immediate family) and/or the student, the Province of Ontario is prepared to supplement family/student resources, as determined by an objective form of need assessment. In this way all citizens of the Province may be assured that opportunities in education and that available funds are being distributed to students on a fair and equitable basis.

A Student Loans Plan has been established by the Federal authorities, with the agreement of the participating provinces. Loans awarded under the Plan are interest free until six months after graduation or discontinuance of study, and no repayment of principal is required so long as the applicant is enrolled as a full-time student. At that time he will begin to repay the total amount he has borrowed, together with interest calculated at the prevailing rate. The method and the rate of repayment is arranged directly between the student and the bank at which the loan was negotiated.

Application forms are available at the office of the Student Affairs Administrator, The George Brown College, P.O. Box 1015, Station B, Toronto 2B, Ontario, at any time after June 1st.

Employment Service
The College assists students in obtaining placement both during the summer vacation and after graduation. Further information is available through the office of the Student Affairs Administrator.

Apprentice Programs

The courses outlined in this section of the calendar are offered in co-operation with the Industrial Training Branch of the Department of Labour under the provisions of the Apprenticeship and Tradesmen's Qualification Act, 1964. Every eligible person above the age of sixteen years, employed in a capacity other than a journeyman in a designated trade must be registered and under contract with the Industrial Training Branch of the Department of Labour. Under the terms of the Act, apprenticeship contracts are written in terms of periods of hours rather than calendar periods as was the case prior to 1964.

In addition to on-the-job training, all registered apprentices are required to attend regular day classes consisting of trade theory and practice, and academic subjects relating to their trade at a College of Applied Arts and Technology.

The in-school period normally consists of three courses. The initial (basic) course of 7 to 8 weeks duration is usually conducted during the first or second period of the apprenticeship contract. A second (intermediate) course of 7 weeks duration would follow and be held during the second or third period of the contract. The third (advanced) course is also 7 or 8 weeks but it would be conducted in the latter period of the apprenticeship contract. In the trades of Baker and Chef, these apprentices attend a 15-week basic course in their initial period of apprenticeship followed by a 15-week advanced course prior to their completing the final apprenticeship period. Apprentices in the trades of Barber and Hairdresser attend one 18-week course only. Retail Meat Cutter apprentices are only required to complete a 15-week course.

These courses are arranged by the Department of Labour under a Federal-Provincial training agreement and are free of charge to registered apprentices. To cover the cost of room and board, living allowances are paid by the Federal Department of Manpower and Immigration or the Ontario Department of Labour while the apprentice is attending school. For out-of-town apprentices the cost of transportation is provided to and from the training centre at the beginning and end of each course.

In certain of the trades requiring compulsory certification of qualifications, persons in possession of the Secondary School Graduation Diploma granted upon completion of Grade 12 of either the Science Technology and Trades Branch or the Arts and Science Branch are granted credit for a specific number of hours from each period of the apprenticeship term. In addition to the preceding, persons in possession of a Grade 12 diploma endorsed in a subject corresponding to the apprenticeship program to be pursued will be excused from taking the basic course of in-school training. Where credit is applicable it is so stated under the course outline of the trade so affected.

It is important to note that these courses are available to *Registered Apprentices Only*. Prospective apprentices may obtain further information by writing to:

Director, Industrial Training Branch, Ontario Department of Labour, 74 Victoria Street, Toronto, Ontario.

The following apprenticeship courses are offered at this College:
Baking
Barbering
Carpentry
Cement Mason
Chef Training
Electrical Construction
Glazier & Metal Mechanic
Hairdressing
Industrial Electronic Controls
Ironworker
Lathing
Machinist
Masonry
Millwright
Painting and Decorating
Plastering
Plumbing
Radio and Television
Refrigeration and Air Conditioning
Retail Meat Cutting
Sheet Metal Mechanic
Steamfitting
Structural Steel Drafting
Toolmaking

Note: As it is necessary to prepare the materials for this Calendar well in advance of the beginning of each school year, revisions to the length of the apprenticeship term and the length of the in-school training period cannot be anticipated.

Awards, Bursaries and Scholarships

Many construction, industrial and commercial companies support the College directly with the gifts or loan of highly specialized equipment. Others provide financial support for students they sponsor. In addition to this, the following bursaries and scholarship are available.

O.A.C.E.T.T. Award
Awarded by the Ontario Association of Certified Engineering Technicians and Technologists to the top graduate from any Technician course.

O.G.C.A. Awards
Awarded by the Ontario General Contractors Association to:
(1) the top graduate from the Construction Technician Course.
(2) the student showing the greatest improvement over a two year Construction Technician Course.

Wm. C. McGolpin Award
Awarded by the Canadian Structural Clay Association to the top Bricklaying and Masonry apprentice of the year in the Advanced Course.

Toronto Construction Association Award
Awarded by the Toronto Construction Association to the advanced apprentice with the highest standing in the Carpentry Course.

Canadian Gypsum Awards
Awarded by the Canadian Gypsum Company to the apprentice with the highest standing in Lathing and to the apprentice with the highest standing in Plastering.

Plastering Information Centre Awards
Awarded by the Plastering Information Centre to the apprentice with the highest standing in Practical work of the advanced Lathing class and to the apprentice with the highest standing in Practical work of the advanced Plastering class.

Piggott Award
Awarded by the Department of Labour for Piggott Construction to the top apprentice of the year.

Mechanical Construction Association of Ontario Awards
Awarded by the Mechanical Construction Association to the most outstanding advanced apprentices in the Plumbing and Steamfitting Courses.

Sheet Metal Association Award
Awarded by the Sheet Metal Association to the top advanced apprentice of the year.

Howard Wilson Refrigeration Award
Awarded by the Canadian Refrigeration and Air Conditioning Association to the top advanced apprentice in the Refrigeration Course.

Massey-Ferguson Award
Awarded by Massey-Ferguson Industries Limited to the graduating student of the Machine and Product Design program who has shown the greatest improvement in knowledge and skill over the two years of the program.

Society of Plastics Engineers—Ontario Section Bursary/up to $100.00
This fund which is donated by the Society of Plastics Engineers enables the College to grant bursaries to a total of $100.00 to deserving students enrolled in the Plastics Technician program. Applications should be made to the Casa Loma Campus Registrar.

Ontario Medical Secretaries Association Award
Awarded by the Ontario Medical Secretaries Association to the top student in the Medical Secretarial Course.

The Florence Montgomery Bursary Award/$100.00
Awarded annually by the Canadian Restaurant Association, Toronto and District Branch, to the top all-round student graduating from the advanced course of Chef Training.

The Escoffier Club Bursary Award/$100.00
Awarded annually by the Escoffier Club of Toronto (Association of Professional Chefs) to the top all-round student graduating from the basic course of Chef Training.

Stafford Foods Award
Awarded by Stafford Foods to the top advanced Baker Apprentice.

Lallemand Incorporation Award
Awarded by Lallemand Incorporation to the top basic Baker Apprentice.

F. G. Bradley Company Scholarship
Awarded by the F. G. Bradley Company to a person who:
(a) has successfully completed the Apprentice Chef Training program in the Province of Ontario with an average standing of 3.4 grade point or better on both Basic and Advanced Courses.
(b) has passed the Journeyman's Certification Examination as set by the Ontario Department of Labour.
(c) has applied to and has been accepted by George Brown College as a student on the 2-year Food Administration Course.

Dining Room Service Award
Awarded by the Canadian Restaurant Association, Toronto and District Branch, to the top student in Dining Room Service.

John Arena Award
Awarded by Mr. John Arena, Winston Grill Restaurant, to the top student in Dining Room Service.

The Maitre d'Hotel Association Award
Awarded by Maitre d'Hotel Association of Toronto to the most successful student of the previous year in Dining Room Service.

C. R. A. Foundation Bursary Award
Awarded by the Canadian Restaurant Association to a student enrolled in the final year of a two or three-year management or supervisory course in Restaurant, Hotel Resort and/or Institutional Management in recognized Schools of Technology and in Community Colleges meeting the requirements of the Awards Committee of the C. R. A. Foundation.

The Consumers' Gas Scholarship
Awarded by The Consumers' Gas to the top first-year student.

Merit Graduation
Awarded by C. D. Mallory Incorporated to:
(1) the top student in Marine Engineering.
(2) the top student in Marine Navigation.

Most Deserving Cadet
Awarded by Marine Club to:
(1) the student who shows the best all-round ability in Marine Engineering.
(2) the student who shows the best all-round ability in Marine Navigation.

Best 1st Year Cadet
Awarded by Upper Lakes Shipping Company to:
(1) the student who shows the best all-round ability in 1st year at sea in Marine Engineering.
(2) the student who shows the best all-round ability in 1st year at sea in Marine Navigation.

Most Improved Cadet
Awarded by Canada Steamship Lines to:
(1) the student who shows the most improvement from the time of commencing the course to the end of his first year in Marine Engineering.
(2) the student who shows the most improvement from the time of commencing the course to the end of his first year in Marine Navigation.

The Armatek Controls Award
Awarded by Armatek Controls Ltd. to a graduating student of the Instrumentation Technician program who has demonstrated the best overall performance while on the program.

Canadian Jewellers Institute Bursary/up to $175.00
Awarded by the Canadian Jewellers Institute to the top student in the first or second year of the Watchmaking Course.

H. & W. Perrin Award/$100.00
Awarded by H. & W. Perrin Company Limited to the student who has made the greatest progress during the year in the first or second year of the Watchmaking Course.

Toronto Jewellers Supply Company Award/$100.00
Awarded by the Toronto Jewellers Supply Company Limited to the student who has made the greatest progress during the year in the first or second year of the Watchmaking Course.

Bulova Watch Company Award
Awarded by the Bulova Watch Company Limited to a first or second year student in the Watchmaking Course who has been most consistent in attendance and has shown the greatest effort during the year.

New Courses

New programs are constantly in the planning stage, some of which may be operative in the near future. Information relative to these programs may be obtained by writing to: The George Brown College of Applied Arts and Technology, P.O. Box 1015, Station B, Toronto 2B, Ontario, or by phoning 362-3971.

Courses are continuously modified and revised in order to keep tuition fees in step with industrial requirements. All programs are subject to change without prior notice.

The Curriculum

The George Brown College offers a wide variety of courses leading to vocational competence, to examination and official certification, and to the general enrichment of the individual student. While it is recognized that certain standards of proficiency in particular areas of study are necessary for employment in some vocations, it is also recognized that individual students bring with them to the College certain established abilities, and that their needs differ widely. To provide for the greatest possible flexibility, the calendar describes programs which lead to particular vocations, and courses which make up these programs. Most students will wish to undertake a prescribed program, but others may:

1. Take an enriched program by adding to it another course.
2. Take a light program by omitting one or two courses.
3. Substitute courses for those within a program for which exemption or credit has been granted.
4. Take one or two courses at a time with a view to building program credit and certification.

Students who wish to apply for exemption from a course within a prescribed program should do so in writing during the third week of attendance at the College.

(Forms are available through the Department offices)

Grading and Grade Reporting

The following system of grading is used to indicate the quality of a student's work:

Grade	*Explanation*	*Point Value*
A	excellent	4
B	good	3
C	average	2
D	below average	1
F	failure	0
WP	withdrawn while passing	
WF	withdrawn while failing	
K	incomplete	

A course in which a student has failed must be repeated if credit is desired. A grade of F is assigned if a student fails to carry out the prescribed procedures when withdrawing from a course or from the College, or if he fails to clear a grade of K in the prescribed time. The grade of K indicates that work is satisfactory as far as completed. It permits the student after consultation with his department head to complete the work in a reasonable period of time. The grade of K is given only in cases of illness or other extenuating circumstances.

Promotion for Students Who Have Failed One or Two Courses

1. A Student who has failed a course is permitted to pursue his successful courses in the following year.
2. A student with a grade point average of 2.5 or more may apply to pursue one unsuccessful course in the following year, provided that satisfactory arrangements are made to make up the deficiency.
3. A student with a grade point average of 3.0 or more may apply to pursue two unsuccessful courses in the following year provided that satisfactory arrangements are made to make up the deficiency.
4. A student may modify a standard program by making application for enrolment in his own selection of courses. On satisfactory completion of any course a certificate will be issued; however, a student completing any number of such courses will not receive a diploma unless he has completed a standard program.

Grade Point Average

A grade-point system is used to determine performance. To determine a grade point average (GPA) divide the total grade points by the credit units of the course taken. The number following the title of a course indicates the credit unit value of the course in each program.

$$\text{GPA} = \frac{\text{Grade Points}}{\text{Credit Units}} \quad \text{(see glossary)}$$

A minimum grade-point average of 2.0 is needed to complete a program. Students may repeat courses in which a failing (F) or below average (D) grade has been received. Credit for a course is allowed but once in a program; both grades are counted in computing the grade-point average.

Glossary of Terms

HOUR/One period on the timetable.

SESSION/Any course length less than 13 weeks.

SEMESTER/Any course length of 13 to 26 weeks.

CORE COURSES/are compulsory within a prescribed program which leads to a certificate or diploma.

OPTIONS/Alternative courses within a prescribed program. Under certain circumstances, options and/or electives may be chosen with the recommendation of the respective chairman.

CERTIFICATE/A certificate is issued upon satisfactory completion of a prescribed program less than 4 semesters in length.

DIPLOMA/A diploma is issued upon satisfactory completion of a prescribed program 4 semesters or more in length.

ENDORSEMENT/Credits for additional courses taken along with a prescribed program. The credit appears on the face of the certificate or diploma earned.

CREDIT UNIT/A unit used to indicate performance, that measures time spent according to the following table:

Type of Program	*Credit Units*	*Periods/Shop or lab*	*Periods/Theory or Related Subjects*	*Per Semester or Session*
Programs 1–39	1	3	2	Semester
Programs 40–69	1	2	1	Semester
Programs 70–99	1	2 or 3	1	Session

Note: Any fraction occurring (either 1/3 or 2/3) will be regarded as half a unit. Actual allocations are determined by the chairman.

GRADE POINTS/Result from credit units multiplied by the point value of the grade.

GRADE POINTS AVERAGE (GPA)/Results from total Grade Points earned divided by credit units attempted. Courses for which exemptions have been granted are not included in the calculation of the GPA.

Example:

Credit Units	*Grade*	*Grade Points*
3	B(3)	9

The number of a program indicates the length of the program as follows:

1–39	Programs of 4 semesters or more
40–69	Programs of less than 4 semesters
70–99	Programs of 1 session.

Academic Studies

The George Brown College of Applied Arts and Technology

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Developmental Studies

The programs in Developmental Studies are designed to raise a student's educational level in those subjects that are required for entry into the various programs of the College.

Three programs or levels are offered in Basic Training for Skill Development. Each program provides the opportunity for a student to reach the academic level that is considered the equivalent for the prerequisites stated in the College programs of studies.

The Basic Training for Skill Development program of studies consists of three core courses–Mathematics, Language and Communication, and Science–plus option courses that are appropriate to student's final objective, such as typing if the student is planning to enter the commercial field, or drafting if the student is planning to enter the technical field.

Level 1 – AS41–OMRP401
Basic literacy and computation skills.

Level 2 – AS42–OMRP402
Entry to Colleges of Applied Arts and Technology programs that presently require the equivalent to Grade 10.

Level 3 – AS43–OMRP403
Entry to Colleges of Applied Arts and Technology programs that presently require the equivalent to Grade 12.

AS 41 — OMRP 401

Course Designation	Course Content	Credit Units per Semester	Hours/week
Semester I & II			
ENG 142	Language and Communications	18	18
MATH 142	Mathematics	12	12
		30	30
Semester III			
ENG 143	Language and Communications	10	10
MATH 143	Mathematics	10	10
PHYS 143	Science	6	6
OPTION	Elective Studies	4	4
		30	30
Semester IV			
ENG 143	Language and Communications	10	10
MATH 143	Mathematics	10	10
PHYS 143	Science	6	6
OPTION	Elective Studies	4	4
		30	30

AS 42 — OMRP 402

Course Designation	Course Content	Credit Units per Semester	Hours/week
Semester I			
ENG 146	Language and Communications	7	7
MATH 146	Mathematics	7	7
PHYS 146	Science	7	7
OPTION	Typing 146 or Drafting 141	4	7
ES 146	Elective Studies	2	2
		27	30
Semester II			
ENG 146	Language and Communications	7	7
MATH 146	Mathematics	7	7
PHYS 146	Science	7	7
OPTION	Typing 146 or Drafting 141	4	7
ES 146	Elective Studies	2	2
		27	30

For Information Only

Weeks	Program Code	Description	Math.	Eng.	Approx. standing
12	B73·412	Business Math.			
40	B51-413	Bus. Mach. & Bookk.	5.148	5.149	G 12
40	B52-417	Comm.	5.152	5.146	G 10
24	B53-415	Clerk	4.152	4.146	G 10
	B48-419	Sec. Steno.		5.149	G 12
40	B54·416	Accounting	8.148	7.148	G 12
24	B55-426	Inventory	5.156		G 10
16	B56-442	Comm. Ref.	4.156	4.156	G 10
16	B57-450	Typing Gen.	5.156	5.156	G 10
12	B74·443	Typing Ref.		6.156	

AS 43 — OMRP 403 (Technical)

Course Designation	Course Content	Credit Units per Semester	Hours/week
Semester I			
ENG 147	Language and Communications	7	7
MATH 147	Mathematics	8	8
PHYS 147	Science	8	8
DR 142	Drafting	2.5	5
OPTION	Elective Studies	2	2
		27.5	30
Semester II			
ENG 147	Language and Communications	7	7
MATH 147	Mathematics	8	8
PHYS 147	Science	8	8
DR 142	Drafting	2.5	5
OPTION	Elective Studies	2	2
		27.5	30

Teaching Techniques/Ap70

The increasing pace of technological advancement in industry and commerce is changing our traditional concepts of education. No longer is it possible to view education as a preparation for life, it is in fact a continuous lifelong process of adaptation and change to suit the needs of the individuals in a rapidly-changing environment. More and more adults find themselves in the formal classrooms of traditional educational institutions learning new bodies of knowledge or new techniques while others manage to make the adjustments demanded of them by an exercise of their own ingenuity and self-directed learning. Between these two positions is a large volume demand for training on the job. Industrial and commercial enterprises are increasingly faced with the necessity of training and retraining their employees. To accomplish this many people in factories and offices find that their full-time occupation is that of an instructor as they adapt people to new skills and techniques or prepare them to take supervisory positions. Although there is a great demand for skilled manpower at present, a greater problem over the next ten or twenty years will be the preparation of people for promotion.

This course has been designed to help instructors improve their teaching skill to acquaint them with a greater variety of techniques and to broaden their understanding of the teaching-learning process as it concerns adult education. This is essentially a practical course concerned with practices and techniques. It introduces only as much pedagogical theory as is essential to a rudimentary understanding of the processes involved.

The program can be modified to meet individual needs of companies or organizations.

**This course will be offered in the Summer if enough candidates apply.*

Length of Course: 3 weeks

Admission Requirements: Anyone who is employed as an instructor or who may expect to be so employed

Course Designation	Course Content
ED 160	Teaching Techniques

* – Addition

Visiting Homemaker/Ap72–OMRP414

This course is designed to prepare mature women to assume the management of a home in order to maintain and preserve wholesome family life either under normal circumstances or when family life is threatened with disruption because of illness, death, social maladjustment or other problems.

Courses are offered in child growth and development from conception to adolescence as well as an understanding and care of the elderly (geriatrics).

A knowledge of different patterns, the function and role of the family in today's society provides an understanding of the circumstances requiring the Visiting Homemaker's (or F.C.W.) assistance. Students receive instruction and practice in household skills, home management and budgetting. Personal guidance and an understanding of oneself is felt to be essential to meaningful relationships with others.

An understanding of good nutrition and methods of food preparation aid the Homemaker in efficient care of the home.

Visits to community service organizations provide the student with an awareness of resources available to the family or individual.

Visiting Homemakers find employment with Visiting Homemaker Associations throughout the province, Children's Aid Societies, commercial family or service agencies, Canada Manpower Employment Service, Welfare departments or such related fields as nursing homes or private employment.

Length of course: 12 weeks

Hours per week: 30

Fee: $2.00 per weeek or sponsored through Canada Manpower

Admission Requirements: A mature woman with emotional steadiness, physical vigour, sincere interest and tolerance for all people plus some experience in plain cooking, child care and home management

Course Designation	Course Content	Program hours
VH 130	Child Growth and Development	36
VH 131	Function of the Family	12
VH 132	Geriatrics	18
VH 133	First Aid	18
VH 134	Home Nursing and Child Care	36
VH 135	Home Management and Budgetting	72
VH 136	Household Skills	36
VH 137	Community Resources	36
VH 138	Nutrition and Food Preparation	72
VH 139	Personal Guidance	6
VH 140	Mental Health	18
		360

Applied Arts

The George Brown College of Applied Arts and Technology

CONTINUING EDUCATION CONTINUING EDUCATION CONTINUING EDUCATION

Applied Arts
Architectural Technology

Child Care Worker/Ap1

Child Care Workers are responsible for the twenty-four hour care of children living away from their homes. Children whose behaviour is disturbed need skilled care. Courses are offered in infant, child and adolescent growth and development and in the nature of disturbed behaviour.

Total care requires a thorough knowledge of child health and illness, first aid and home nursing, and an insight into psychosomatic disturbances. Skills in program planning are considered in detail as well as an understanding of the meaning these have for children. Programs include craft work, indoor and outdoor games, camping and swimming and other leisure-time activities.

Knowledge of the function of the family and the place of the individual in society provides understanding of the social environment from which many disturbed children come and conditions which contribute to child and family breakdown.

Visits of observation to agencies and institutions in the city and province are provided. Students are instructed in legislation affecting the welfare, protection and care of children, and in the historical circumstances leading to the creation of welfare agencies.

Child Care Work is concerned with children from six years to the end of adolescence. Practical experience is gained through field work where students are under the direction of skilled supervisors who advise and guide the students in their care of disturbed and sick children.

Child Care Workers find employment in provincial institutions and treatment centres, and in private social agencies, group homes and hospitals.

First Year

Course Designation		*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
CHI	160	Field Practice	8	16
CHI	161	Child Study I	4	4
CHI	162	Health and First Aid	2	4
CHI	163	Function of the Family	1	1
CHI	164	Caring for the Disturbed Child	2	2
CHI	165	Activities with Children	2	2
CHI	166	Social Services	2	3
CHI	167	Psychiatric Seminar	1	1.5
			22	33.5

Second Year

CHI	260	Field Practice	12	24
CHI	261	Child Study II	2	2
CHI	263	Individual in Society	2	2
CHI	264	Therapy of Play	1	1
CHI	265	Activities with Children	2	2
CHI	266	Introductory Psychology	2	2
CHI	267	Psychiatric Seminar	1	1.5
			22	34.5

Dental Technician/Ap2

Dental technology is concerned with all aspects of dental laboratory procedures such as dentures, bridgework, ceramics, partial dentures, Orthodontic appliances etc. A technologist trained in these procedures is called a dental technician.

The dental technician may be employed by one dentist or he may operate a laboratory alone; he may be the owner of a laboratory employing a few or many technicians or he may be an employee in a laboratory owned by an individual or a firm.

The dental technician will find much satisfaction in knowing that he is rendering an essential health service through the dental profession to the public. Another source of pleasure is the infinite variety of the work itself and the artistry and skill involved in doing it.

With the guidance and advice of a committee representing both the Royal College of Dental Surgeons of Ontario, and the Governing Board of Dental Technicians, a 3-year program of studies is provided. This will include the theory and practice of all aspects of dental laboratory work and will include a related subject program designed to give insight to the problems of small business management. Eighty per cent of the course will consist of practical laboratory work.

First Year

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
DENT 100	Dental Lab. and Lec. I	13	19
DENT 101	Dental Materials	1	1
DENT 102	Dental Anatomy	1	1
ENG 100	English	2	2
DENT 103	Science of Dental Materials	2	2
CHEM 107	Chemistry	2	2
EC 100	Economics (Semester I)	1	1
MATH 107	Technical Mathematics	2	2
		24	30

Second Year

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
DENT 200	Dental Lab. and Lec. II	15	21
ENG 200	English	2	2
DENT 203	Science of Dental Materials	2	2
MATH 207	Business and Bookkeeping	2	2
CHEM 207	Chemistry	2	2
EC 200	Economics (Semester II of EC 100)	1	1
		24	30

Third Year

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
DENT 300	Dental Lab. III	20	26
EC 300	Business Management	2	2
MET 300	Metallurgy	2	2
		24	30

Jewellery Arts/Ap40

Occupations in this field are as many and varied as the variety of decorative products which come from the jewellers bench. Specialization is growing, and in the province of Ontario, this program alone is designed and listed as a certified two year course. The initial ten weeks in the program are devoted to the care and use of tools and equipment, introduction of basic processes and techniques, and elementary design. During the balance of the term students select an area of concentration from, jewellery making, diamond setting, engraving, or silver-smithing. Graduates are offered a third year of advanced studies and are excused from regular course outline. Depending on the degree of specialization, graduates find employment in the jewellery industry, manufacturing companies, engraving firms, or retail jewellery shops.
Length of Course: 2 Years
Entrance Requirements: Grade 12 or equivalent

First Year

Course Designation	*Course Content*
JWL 160	Introduction to Jewellery and or Silversmithing
ENG 132	Language and Communication
SBM 132	Small Business Management
MET 130	Metallurgy
Elective: either	
JWL 161	Goldsmithing
or 162	Diamond Setting
JWL 163	Engraving *or*
JWL 164	Silversmithing

Second Year

Course Designation	*Course Content*
MET	Metallurgy
Specialization: either	
JWL 261	Goldsmithing
JWL 262	Diamond Setting
JWL 263	Engraving
or	
JWL 264	

depending on First Year Option

Jewellery Arts/Ap4

Occupations in this field are as many and varied as the variety of products which are the result of the craftsman's imagination and skill. Specialization is growing and thus our jewellery arts program is designed with this in mind. The initial ten weeks of the two-year program are devoted to the care and use of tools and equipment, basic processes, techniques, and elementary design. During the balance of the first year and second year students may select an area of concentration: Goldsmithing, Gem-setting, Engraving, or Silversmithing. In order to qualify for a certificate a student must participate in all designated areas in order to gain sufficient credits; (20 credit hours for first year and 21 credit hours for the second year.)

A third year is also offered but is an open program; with a free choice of techniques.

Prerequisite: Demonstrated interest and/or ability but minimum Grade 10 desired

First Year
Specialization depending on 10 weeks operation

Course *Designation*	Course *Content*	*Credit Hrs.*
JWL 160	Introduction to Jewellery	2
JWL 161	Goldsmithing	4
or		
JWL 162	Gem-setting	4
or		
JWL 163	Engraving	4
or		
JWL 164	Silversmithing	4
JWL 165	Theory of the Area of Specialization	2
MET 166	Metallurgy	2
GEM 167	Gemmology	2
CHEM 168	Chemistry	2
DES 169	Design	2
ENG 132	Language and Communication	2
SBM 132	Small Business Management	2
		20

Second Year
Specialization depending on first year operation

Course *Designation*	Course *Content*	*Credit Hrs.*
JWL 261	Goldsmithing	9
or		
JWL 262	Gem-setting	9
or		
JWL 263	Engraving	9
or		
JWL 264	Silversmithing	9
JWL 265	Theory of the Area of Specialization	3
MET 266	Metallurgy	2
GEM 267	Gemmology	3
CHEM 268	Chemistry	2
DES 269	Design	2
		21

Third Year
Open Program 21 Credit Hours
Programs are arranged on an individual basis.

Dental Assisting/Ap41

The graduate of this program will have received a background in the dental sciences, operating room assistance, dental materials and limited dental laboratory methods, dental x-ray techniques, as well as business procedures that will allow her to function as an effective member of the dental team.

Since the Dental Assistant is in constant contact with the public, she should have poise and an outgoing personality.

Length of Program: 1 Year

Admission Requirements: Grade 12 of the four or five year program with mathematics and preferably at least one science

Semester I

Course *Designation*	Course *Content*	*Cr. Units per Semester*	*Hrs. per Week*
DENT 104	Basic Health Science	4	4
DENT 102	Dental Anatomy	2	2
DENT 105	Dental Laboratory	1	2
DENT 106	Dental Materials	2	2
DENT 107	Dental Assisting	5	10
PSY 205	Psychology	1	1
DENT 108	Professional Development	1	1
OP 114	Office Practice	4	5
ENG 110	Language and Communication	3	3
		23	30

Semester II

Course *Designation*	Course *Content*	*Cr. Units per Semester*	*Hrs. per Week*
DENT 107	Dental Assisting	2	4
DENT 102	Dental Anatomy	2	2
DENT 109	Dental Radiology	2	3
DENT 105	Dental Laboratory	1	2
DENT 110	Oral Hygiene	1	1
OP 114	Office Practice	5	5
DENT 111	Clinical Practice	7	13
		20	30

Hospital Orderly (Training) Ap50–OMRP627

This program, which offers its own rewards and responsibilities, prepares men for a career as members of hospital health teams.

The role of the hospital orderly in the nursing profession is one of ever-growing importance and rising status. He works under the direction of the professional nurse, caring for male patients with special emphasis on individual care. Professional preparation includes self-knowledge and attention to personal health and well-being. This focus moves from self to others and from health to illness. The emotional and physical demands of his work require a hospital orderly to have a tactful and pleasant manner and ability to work with others and to be adaptable. He should be observant, conscientious and reliant in the performance of his duties and have a genuine concern in caring for the sick.

Academic Requirement: Candidate must have Grade 10 or equivalent standing

Length of Program: 20 weeks. Applications should be made through Canada Manpower or the Principal of College Street Campus

Hours per week: 30

Course Designation		Course Content	Program hours
HO	130	Hospital organization and routines	65
HO	131	Patient care	100
HO	132	Nursing procedures and skills	70
HO	133	Anatomy and physiology (systems approach)	25
HO	134	Nutrition and dietetics	10
HO	135	Practical work in hospital	300
PHYS	150	Science	20
MATH	146	Mathematics	10
			600

Nursery Aide Course/Ap51–OMRP429

The nursery aide is engaged in the actual care and guidance of pre-school age children under the direction of a qualified nursery supervisor in a nursery school or day nursery. Knowledge of the basic aims and procedures of routine and play activities in different types of nurseries is essential as well as a knowledge of young children. Physical stamina and good health are required in this field, as it is often necessary to lift a child or move materials and equipment.

The adults in a nursery situation must work closely and well together in order to achieve optimal development of each child. It is necessary, therefore, that the nursery aide have the qualities of temperament and personality to work well with small children and with adults.

In order to gain practical experience and to have the opportunity to observe young children in a nursery setting, students are placed in day nurseries and nursery schools in the community and undertake academic work in the college.

Length of Course: 16 weeks

Hours per week: 30

Admission Requirements: Grade 10, through Canada Manpower or George Brown College

Course Designation		Course Content	Program hours
NA	130	History of Preschool Education	12
NA	131	Types of Nursery Settings	6
NA	132	Guidance Methods	96
NA	133	Programs–Routine and Play	96
NA	134	Staff Relationships	18
NA	135	Child Development	72
NA	136	Mental Health	18
NA	137	First Aid	18
NA	138	Field Practice	144
			480

Teaching Techniques/Ap70

The increasing pace of technological advancement in industry and commerce is changing our traditional concepts of education. No longer is it possible to view education as a preparation for life, it is in fact a continuous lifelong process of adaptation and change to suit the needs of the individuals in a rapidly-changing environment. More and more adults find themselves in the formal classrooms of traditional educational institutions learning new bodies of knowledge or new techniques while others manage to make the adjustments demanded of them by an exercise of their own ingenuity and self-directed learning. Between these two positions is a large volume demand for training on the job. Industrial and commercial enterprises are increasingly faced with the necessity of training and retraining their employees. To accomplish this many people in factories and offices find that their full-time occupation is that of an instructor as they adapt people to new skills and techniques or prepare them to take supervisory positions. Although there is a great demand for skilled manpower at present, a greater problem over the next ten or twenty years will be the preparation of people for promotion.

This course has been designed to help instructors improve their teaching skill to acquaint them with a greater variety of techniques and to broaden their understanding of the teaching-learning process as it concerns adult education. This is essentially a practical course concerned with practices and techniques. It introduces only as much pedagogical theory as is essential to a rudimentary understanding of the processes involved.

The program can be modified to meet individual needs of companies or organizations.

**This course will be offered in the Summer if enough candidates apply.*

Length of Course: 3 weeks

Admission Requirements: Anyone who is employed as an instructor or who may expect to be so employed

Course Designation		Course Content
ED	160	Teaching Techniques

* – Addition

Visiting Homemaker/Ap72–OMRP414

This course is designed to prepare mature women to assume the management of a home in order to maintain and preserve wholesome family life either under normal circumstances or when family life is threatened with disruption because of illness, death, social maladjustment or other problems.

Courses are offered in child growth and development from conception to adolescence as well as an understanding and care of the elderly (geriatrics).

A knowledge of different patterns, the function and role of the family in today's society provides an understanding of the circumstances requiring the Visiting Homemaker's (or F.C.W.) assistance. Students receive instruction and practice in household skills, home management and budgetting. Personal guidance and an understanding of oneself is felt to be essential to meaningful relationships with others.

An understanding of good nutrition and methods of food preparation aid the Homemaker in efficient care of the home.

Visits to community service organizations provide the student with an awareness of resources available to the family or individual.

Visiting Homemakers find employment with Visiting Homemaker Associations throughout the province, Children's Aid Societies, commercial family or service agencies, Canada Manpower Employment Service, Welfare departments or such related fields as nursing homes or private employment.

Length of course: 12 weeks

Hours per week: 30

Fee: $2.00 per weeek or sponsored through Canada Manpower

Admission Requirements: A mature woman with emotional steadiness, physical vigour, sincere interest and tolerance for all people plus some experience in plain cooking, child care and home management

Course Designation		Course Content	Program hours
VH	130	Child Growth and Development	36
VH	131	Function of the Family	12
VH	132	Geriatrics	18
VH	133	First Aid	18
VH	134	Home Nursing and Child Care	36
VH	135	Home Management and Budgetting	72
VH	136	Household Skills	36
VH	137	Community Resources	36
VH	138	Nutrition and Food Preparation	72
VH	139	Personal Guidance	6
VH	140	Mental Health	18
			360

Architectural Technology

The George Brown College
of Applied Arts and Technology

Architectural Technology

Air Conditioning Technician/Ar1

An air conditioning technician is concerned with the design, maintenance, and operation of air conditioning and refrigeration systems used in public buildings, storage facilities, and manufacturing activities.

The refrigeration and air conditioning industry provides many challenging opportunities. System design layout, equipment selection, contract supervision and sales promotion are among the many areas covered in this industry. Contact with manufacturing and wholesale organizations can widen the scope of interest.
Length of Course: 2 Years
Admission Requirements: Grade 12

First Year

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
AIR 100	Principles of Refrigeration	4	4
AIR 101	Psychrometrics and Load Estimating	4	4
AIR 102	Refrigeration Lab	1.5	3
AIR 103	Air Conditioning System Design	5	5
MATH 100	Mathematics	4	4
ENG 100	Language & Communication	2	2
PHYS 100	Applied Physics I	3	3
EL 100	Electrical Fundamentals	3	3
DR 100	Technical Drawing	1.5	2
		28	30

Second Year

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
AIR 200	Refrigeration and Air Conditioning Lab Practices	2	4
AIR 201	Control Systems—(Electronic and Pneumatic)	8	8
AIR 202	Air Conditioning System Design	5	5
MATH 200	Mathematics	4	4
ENG 200	Language and Communication	2	2
MECH 102	Mechanics	2	2
EC 100	Economics	2	2
PHYS 202	Thermodynamics	3	3
		28	30

Civil Engineering Technician/Ar2

Survey Technician
Municipal Engineering Technician

The various branches of civil engineering deal with problems in all types of structures: bridges and buildings, piers and docks, highways, railways, and airports; in hydro-electric power development; drainage and irrigation works; in all aspects of municipal development: water supply, sewerage systems, and roads.

The Survey Technician course provides the basic theoretical and practical knowledge required for those who wish to enter surveying at the technician level. Skill is attained by intensive field work in surveying with modern equipment. Survey problems are worked out under field conditions and computed and recorded in the drafting room.

The course provides the basic training which leads to positions as technicians with municipal and provincial departments, engineering firms, and construction companies.
Length of Course: 2 Years
Admission Requirements: Grade 12

First Year

Course Designation		*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
SURV	100	Survey Computations and Drafting	5.5	8
SURV	101	Plane Surveying	5.5	8
CIV	100	Construction Materials and Methods	3	3
DR	121	Descriptive Geometry	1.5	22
MATH	100	Mathematics	4	4
ENG	100	Language and Communication	2	2
PHYS	100	Applied Physics I	3	3
			24.5	30

Municipal Engineering Option

Course Designation		*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
SURV	201	Advanced Plane Surveying	4	6
CIV	203	Transportation	4	4
CIV	202	Municipal Services	4	4
CIV	200	Structures	1.5	2
CIV	204	Codes and Specifications	2	2
SURV	202	Photogrammetry	2	2
MATH	200	Mathematics	4	4
ENG	200	Language and Communication	2	2
EC	100	Economics	2	2
MECH	100	Mechanics	2	2
			27.5	30

Survey Option

SURV	201	Advanced Plane Surveying	4	6
SURV	200	Survey Computations and Drafting	2.5	4
CIV	202	Municipal Services	4	4
SURV	204	Legal Surveys	2	2
SURV	203	Practical Astronomy	2	2
SURV	202	Photogrammetry	2	2
MATH	200	Mathematics	4	4
ENG	200	Language and Communication	2	2
EC	100	Economics	2	2
MECH	100	Mechanics	2	2
			26.5	30

Drafting Technician/Architectural/Ar4

This course is designed to provide technicians for architects' offices, construction companies, engineering firms, and government departments. The program of instruction is arranged to provide skills in architectural drawing, detailing, rendering, and model building; and to provide knowledge of architectural design, contracts, organization, and business relationships.

Graduates find employment as draftsmen, field representatives, building products salesmen, and expeditors.

Length of Program: 2 Years

Admission Requirement: Grade 12

First Year

Course *Designation*		Course Content	Cr. *Units* per Semester	*Hrs. per* Week
ARCH	100	Materials and Methods	2	2
DR	102	Architectural Drafting I	6	9
DR	120	Descriptive Geometry I	1.5	2
SURV	110	Surveying	2	3
MATH	100	Mathematics	4	4
ENG	100	Language and Communication	2	2
EC	100	Economics	2	2
MECH	100	Mechanics	3	3
PHYS	100	Applied Physics I	3	3
			25.5	30

Second Year

ARCH	200	Materials and Methods	3	3
ARCH	201	History of Architecture	1	1
CO	101	Quantity Surveying I	1	1
DR	111	Mechanical Drafting	2	3
DR	115	Structural Drafting	1.5	2
DR	202	Architectural Drafting II	6.5	10
DR	220	Descriptive Geometry II	1.5	2
MATH	200	Mathematics	4	4
ENG	200	Language and Communication	2	2
MECH	100	Mechanics of Materials	2	2
			24.5	30

Drafting Technician/General/Ar5

Versatility is the keynote of this course by preparing a draftsman for industry who has a general knowledge of the Achitectural, Civil, Survey and Mechanical fields. A draftsman with such a versatile background should be an asset to any drafting office in that his services could be utilized in the various drafting fields.

Graduates find employment in architectural, engineering, survey and consulting offices as well as manufacturing industries.

Length of Program: 2 Years

Admission Requirements: Grade 12

First Year

Course *Designation*		Course Content	Cr. *Units* per Semester	*Hrs. per* Week
DR	102	Architectural Drafting I	4.5	7
DR	125	Machine Drafting I	4.5	7
DR	108	Structural Drafting I	1.5	2
DR	120	Descriptive Geometry I	1.5	2
SURV	110	Surveying	2	3
MATH	100	Mathematics	4	4
ENG	100	Language and Communication	2	2
MECH	100	Mechanics	3	3
			23	30

Second Year

DR	154	Art and Presentation	1.5	2
DR	202	Architectural Drafting II	4.5	7
DR	231	Machine Drafting II	4	6
MACH	110	Workshop Technology	2	4
MATH	200	Mathematics	4	4
ENG	200	Language and Communication	2	2
MECH	110	Mechanics of Materials	2	2
PHYS	100	Physics	3	3
			23	30

Drafting Technician/Mechanical Services Ar7

This course is designed to prepare technicians for positions in an architect's or consultant's office as a draftsman or estimator in the mechanical installation department. The student will gain some knowledge of the design and a thorough knowledge of the graphical layout of all of the mechanical services required in an architectural structure, plus a general knowledge of the architectural and structural components and methods of construction. A very broad and indepth study is taken in the areas of air conditioning, refrigeration, warm air, water and steam heating systems, plumbing and drainage systems.

Length of Program: 2 Years

Admission Requirements: Grade 12

First Year

Course Designation	Course Content	*Cr. Units per Semester*	*Hrs. per Week*
DR 106	Architectural Drafting I	2.5	4
DR 107	Mechanical Installation Drafting I	4	6
DR 109	Electrical Installation Drafting I	2.5	4
DR 120	Descriptive Geometry I	1.5	2
SURV 110	Surveying	1.5	2
MATH 100	Mathematics	4	4
ENG 100	Language and Communication	2	2
MECH 100	Mechanics	3	3
PHYS 100	Applied Physics I	3	3
		24	30

Second Year

DR 228	Air Conditioning and Refrigeration	5.5	8
DR 229	Heating Systems	2.5	4
DR 230	Plumbing Systems	4	6
MATH 200	Mathematics	4	4
ENG 200	Language and Communication	2	2
MECH 110	Mechanics of Materials	3	3
MECH 115	Mechanics of Fluids	3	3
		24	30

Drafting Technician/Structural/Ar8

In the forefront of Canadian industry stand the many engineering firms and fabricators of structural steel and reinforced concrete. In the offices and shops of these companies plans and preparations are made to produce multi-storied buildings, railway and highway bridges, and numerous other forms of structures framed in steel, concrete and wood.

The preparation of these drawings is a science and art. The draftsman responsible must be familiar with the many techniques and details of construction, and should provide for the installation of the allied material necessary to complete the structure.

For the young man gifted with a talent for technical work, the opportunity to play a part in the construction industry offers a most interesting vocation. To be one of the team which is building the modern scene is itself a satisfying experience. It is for the purpose of assisting the young man with ambition that this course is offered. Graduates of the course will find a waiting field in engineering offices, fabricating companies, municipal and governmental offices.

Length of Program: 2 Years

Admission Requirements: Grade 12

First Year

Semester I

Course Designation	Course Content	*Cr. Units per Semester*	*Hrs. per Week*
CO 104	Site Engineering	1.5	2
CO 200	Building Construction	2.5	4
DR 120	Descriptive Geometry I	2.5	4
STR 122	Structural Detailing	5.5	8
MATH 100	Mathematics	4	4
ENG 100	Language and Communication	2	2
MECH 100	Mechanics	6	6
		24	30

Semester II

CO 200	Building Construction	2.5	4
DR 120	Descriptive Geometry I	2.5	4
STR 122	Structural Detailing	7	10
MATH 100	Mathematics	4	4
ENG 100	Language and Communication	2	2
MECH 110	Mechanics of Materials	6	6
		24	30

Second Year

Semester I

Course Designation	Course Content	Cr. *Units per Semester*	*Hrs. per Week*
CO 103	Construction Materials	3	3
CO 204	Mechanical and Electrical Installations	2	3
STR 212	Structural Steel–Problems and Drawing	5.5	8
STR 213	Reinforced Concrete–Problems and Drawing	4.5	7
MATH 200	Mathematics	4	4
ENG 200	Language and Communication	2	2
MECH 210	Mechanics of Materials	3	3
		24	30

Semester II

CO 103	Construction Materials	3	3
CO 204	Mechanical and Electrical Installations	2	3
STR 214	Project Drawing	10	15
MATH 200	Mathematics	4	4
ENG 200	Language and Communication	2	2
MECH 210	Mechanics of Materials	3	3
		24	30

Concrete Technician/Ar9

This program is designed to equip the graduate with the knowledge and techniques required for employment within the ever-expanding concrete industry.

The graduate will be able to operate at a significant and unique place in the labour force–between the engineer and the skilled craftsman. He will be familiar with the responsibilities and talents of both.

The curriculum has been designed to encompass a wide range of courses and will open up job opportunities in concrete construction, inspection, manufacturing, supply and sales.

Length of Program: 2 Years

Admission Requirements: Grade 12

First Year

Semester I

Course Designation	Course Content	Cr. *Units per Semester*	*Hrs. per Week*
CO 101	Quantity Surveying I	3	3
CO 104	Site Engineering	2	3
CO 105	Principles of Concrete	2.5	4
CO 106	Concrete Construction Methods I	4	4
CO 107	Blueprint Reading and Drafting	2.5	4
MATH 100	Mathematics	4	4
ENG 100	Language and Communication	2	2
MECH 100	Mechanics	6	6
		26	30

Semester II

CO 101	Quantity Surveying I	3	3
CO 104	Site Engineering	2	3
CO 105	Principles of Concrete	2.5	4
CO 106	Concrete Construction Methods I	4	4
CO 107	Blueprint Reading and Drafting	2.5	4
MATH 100	Mathematics	4	4
ENG 100	Language and Communication	2	2
MECH 110	Mechanics of Materials	6	6
		26	30

Second Year

Semester I

CO 203	Contracts and Specifications	4	4
CO 205	Concrete Structural Design	5	5
CO 206	Concrete Construction Methods II	3.5	5
CHEM 215	Chemistry	4	4
PSY 204	Industrial Psychology and Salesmanship	4	4
MATH 200	Mathematics	5	5
ENG 200	Language and Communications	3	3
		28.5	30

Semester II

CO 203	Contracts and Specifications	4	4
CO 205	Concrete Structural Design	5	5
CO 206	Concrete Construction Methods II	3.5	5
EC 214	Business Management and Labour Relations	4	4
CHEM 215	Chemistry	4	4
MATH 200	Mathematics	5	5
ENG 200	Language and Communications	3	3
		28.5	30

Drafting/Ar40–OMRP615

This course is designed to teach and develop all the modern techniques that a draftsman may encounter in any drafting or engineering office. The students will gain the experience of working with various types of media, of using all the modern instruments and of applying all the current methods presently being employed in the fields of drafting, tracing and technical illustrating.

Graduates of this course find employment in architectural and engineering offices, municipal and provincial offices and electrical or electronic offices. Students graduating from this program with honours standing will be considered for admission in the technician program.

Length of Program: 1 Year (40 Weeks)

Admission Requirements: Grade 10

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
DR 151	Architectural Drawing	6	9
DR 152	Mechanical Drawing	4.5	7
DR 153	Schematic Drawing	3.5	5
DR 154	Art and Presentation	2.5	4
MATH 130	Mathematics	3	3
ENG 130	Language and Communication	2	2
		21.5	30

Oil Burner Servicing/Ar41–OMRP634

This course prepares the student to service completely many and varied types of automatic heating systems. The student who successfully completes the course will be capable of performing complete annual overhauls and of providing efficient heating service during the heating season. He will be capable of adjusting burners so that they will operate with the highest possible combustion efficiency. He will have a general knowledge of the different types of heating systems, including gravity warm air, gravity hot water, forced hot water, and steam. He will also have a basic knowledge of electricity and pipe fitting. During the course, the importance of 'customer relations', good workmanship, and neatness is continually stressed. The great scarcity of skilled servicemen gives students every expectation of rewarding employment upon graduation. Those who have the necessary business acumen and drive may seek to establish their own dealerships within a relatively short period of time.

During the past years, hundreds of thousands of automatic heating systems have been installed in Canada. This expansion has brought with it demands for qualified personnel to install and maintain this equipment.

Length of Program: 20 Weeks

Admission Requirements: Grade 10

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
HT 130	Domestic Oil Burners	3.5	5
HT 131	Oil Burners	5.5	8
HT 132	Heating	2	3
HT 140	Gas Burners	2.5	4
DR 131	Drafting and Blueprint Reading	1.5	2
MATH 133	Mathematics	4	4
ENG 141	Language and Communication	2	2
PHYS 133	Applied Physics	2	2
		23	30

Heating Technician/Ar42–OMRP651

The Heating Technician course is designed to develop a technician who can estimate, install, service, and sell domestic and commercial heating systems. By theoretical and practical instruction, the course aims to provide a thorough knowledge of the combustion of fuels, automatic controls, systems design, pipe fitting, and maintenance. The successful student will find rewarding employment with oil companies, heating and cooling companies, gas utilities and manufacturers of fuel burning equipment.

In the heating field, there is a considerable demand for technical personnel who are knowledgeable in oil, gas and electric heating and cooling systems. This demand has been created, in part, by the expansion of building construction.

Length of Program: 1 Year (40 Weeks)

Admission Requirements: Grade 12

Semester I

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
HT 100	Domestic Oil Burners	3.5	5
HT 101	Oil Burners	5.5	8
HT 102	Heating	2	3
HT 103	Heating	2.5	4
PHYS 100	Applied Physics I	2	2
MATH 100	Mathematics	4	4
ENG 100	Language and Communication	2	2
DR 100	Technical Drawing	1.5	2
		23	30

Semester II

HT 110	Heating	5.5	8
HT 111	Heating	4.5	7
HT 112	Heating	2	3
HT 113	Heating	1.5	2
PHYS 100	Applied Physics I	2	2
MATH 100	Mathematics	4	4
ENG 100	Language and Communication	2	2
DR 100	Technical Drawing	1.5	2
		23	30

Refrigeration and Air Conditioning Ar44–OMRP641

This course is designed to prepare young men to enter an apprenticeship program leading to certification (compulsory in Ontario) as a journeyman refrigeration mechanic. This is an excellent opportunity for any young man who left school before completing grade 12 to enter a challenging trade that pays well and assures full-time employment. Under an agreement with Industrial Training branch of the Department of Labour, graduates of this course are granted equivalent time off the apprenticeship period and are excused the in-school requirements of the basic course (see Apprenticeship section).

Length of Program: 2 Semesters (34 Weeks)

Admission Requirements: Grade 10

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
DR 136	Drafting	2	3
EL 133	Electrical Theory	2	2
REF 130	Refrigeration Theory	9	9
REF 131	Refrigeration Practice	5	10
WELD 140	Oxy-acetylene Welding, Brazing and Cutting	0.5	1
MATH 134	Mathematics	3	3
ENG 130	Language and Communication	2	2
		23.5	30

Appliance Servicing/Ar45–OMRP601

This course is designed to give a thorough knowledge of the theory and practice required for the maintenance and repair of home appliances. The student should have a high mechanical aptitude. Students are prepared for such occupations as servicemen, factory representatives, field representatives, appliance salesmen, appliance inspectors and production supervisors.

Length of Program: 1 Year (40 Weeks)

Admission Requirements: Grade 10

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
AP 130	Laundry Equipment	5	7
AP 132	Refrigeration	5	7
AP 133	Electrical Appliances	5	7
DR 155	Drafting and Blueprint Reading	1	1
MATH 134	Mathematics	2	2
ENG 130	Language and Communication	2	2
PHYS 138	Applied Physics	2	2
SBM 132	Small Business Management	2	2
		24	30

Signwriting/Ar46–OMRP633

Many large department stores, manufacturing companies, advertising agencies, and retail outlets maintain a staff of signwriters to produce new signs, posters and advertising displays.

Although the competition in this vocation is vigorous, there is ample opportunity for those who show creative ability and commercial effectiveness in their work.

Students are introduced to some of the basic operations of screen process printing to indicate its relationship within the regular commercial sign shop. In addition, those who wish to start their own business will find many possibilities.

Length of Program: 1 Year (40 Weeks)

Admission Requirements:
a) Ontario Department of Education Statement of Standing awarded after successful completion of Grade 10 of any four-year program.
b) A combination of education and experience considered equivalent by the Registrar.

Course Designation	Course Content	*Cr. Units per Semester*	*Hrs. per Week*
SIGN 130	Basic Signwriting and Introduction to Screen Process Printing	14.5	23
MATH 134	Mathematics	3	3
ENG 130	Language and Communication	2	2
PHYS 139	Applied Physics	2	2
		21.5	30

Carpentry/Ar70

Length of Apprenticeship Term
Four periods of 1,800 hours

Length of In-School Training Program
Basic Program: 8 Weeks

Intermediate Program: 7 Weeks
Advanced Program: 7 Weeks

Basic Program

Course Designation	Course Content	*Cr. Units per Semester*	*Hrs. per Week*
CAR 10	Carpentry I	9	22
MATH 10	Mathematics	1.5	3
ENG 10	English	1	2
DR 10	Drafting	1.5	3
		13	30

Intermediate Program

Course Designation	Course Content	*Cr. Units per Semester*	*Hrs. per Week*
CAR 20	Carpentry II	9	22
MATH 20	Mathematics	1.5	3
ENG 20	English	1	2
DR 20	Drafting	1.5	3
		13	30

Advanced Program

Course Designation	Course Content	*Cr. Units per Semester*	*Hrs. per Week*
CAR 30	Carpentry III	9	22
MATH 30	Mathematics	1.5	3
ENG 30	English	1	2
DR 31	Drafting	1.5	3
		13	30

Lathing/Ar71

Length of Apprenticeship Term
Three periods of 1,800 hours

Length of In-School Training Program
Basic Program: 8 Weeks
Intermediate Program: 7 Weeks
Advanced Program: 7 Weeks

Basic Program

Course Designation	Course Content	*Cr. Units per Session*	*Hrs. per Week*
LATH 10	Lathing I	7.5	20
MATH 10	Mathematics	1.5	3
ENG 10	English	1	2
DR 10	Drafting	1	2
WELD 10	Welding	1	3
		12	30

Intermediate Program

Course Designation	Course Content	*Cr. Units per Session*	*Hrs. per Week*
LATH 20	Lathing II	7.5	20
MATH 20	Mathematics	1.5	3
ENG 20	English	1	2
DR 20	Drafting	1	2
WELD 21	Welding	1	3
		12	30

Advanced Program

Course Designation	Course Content	*Cr. Units per Session*	*Hrs. per Week*
LATH 30	Lathing III	7.5	20
MATH 30	Mathematics	1.5	3
ENG 30	English	1	2
DR 36	Drafting	1	2
WELD 31	Welding	1	3
		12	30

Masonry/Ar72

Length of Apprenticeship Term
Four periods of 1,600 hours

Length of In-School Training Program
Basic Program: 8 Weeks
Intermediate Program: 7 Weeks
Advanced Program: 7 Weeks

Basic Program

Course Designation	Course Content	*Cr. Units per Session*	*Hrs. per Week*
MAS 10	Masonry I	7.5	20
MATH 10	Mathematics	1	2
ENG 10	English	1	2
DR 10	Drafting	1.5	3
WELD 10	Welding	1	3
		12	30

Intermediate Program

Course Designation	Course Content	*Cr. Units per Session*	*Hrs. per Week*
MAS 20	Masonry II	7.5	20
MATH 20	Mathematics	1	2
ENG 20	English	1	2
DR 20	Drafting	1.5	3
WELD 20	Welding	1	3
		12	30

Advanced Program

Course Designation	Course Content	*Cr. Units per Session*	*Hrs. per Week*
MAS 30	Masonry III	7.5	20
MATH 30	Mathematics	1	2
ENG 30	English	1	2
DR 30	Drafting	1.5	3
WELD 30	Welding	1	3
		12	30

Painting and Decorating/Ar73

Length of Apprenticeship Term
Four periods of 1,800 hours

Length of In-School Training Program
Basic Program: 8 Weeks
Intermediate Program: 7 Weeks
Advanced Program: 7 Weeks

Basic Program

Course Designation	*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
PAINT 10	Painting and Decorating I	9	23
MATH 10	Mathematics	1.5	3
ENG 10	English	1	2
DR 10	Drafting	1	2
		12.5	30

Intermediate Program

Course Designation	*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
PAINT 20	Painting and Decorating II	9	23
MATH 20	Mathematics	1.5	3
ENG 20	English	1	2
DR 20	Drafting	1	2
		12.5	30

Advanced Program

Course Designation	*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
PAINT 30	Painting and Decorating III	9	23
MATH 30	Mathematics	1.5	3
ENG 30	English	1	2
DR 35	Drafting	1	2
		12.5	30

Plastering/Ar74

Length of Apprenticeship Term
Four periods of 1,600 hours

Length of In-School Training Program
Basic Program: 8 Weeks
Intermediate Program: 7 Weeks
Advanced Program: 7 Weeks

Basic Program

Course Designation	*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
PLAS 10	Plastering I	9	23
MATH 10	Mathematics	1.5	3
ENG 10	English	1	2
DR 10	Drafting	1	2
		12.5	30

Intermediate Program

Course Designation	*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
PLAS 20	Plastering II	9	23
MATH 20	Mathematics	1.5	3
ENG 20	English	1	2
DR 20	Drafting	1	2
		12.5	30

Advanced Program

Course Designation	*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
PLAS 30	Plastering III	9	23
MATH 30	Mathematics	1.5	3
ENG 30	English	1	2
DR 36	Drafting	1	2
		12.5	30

Plumbing/Ar75

Length of Apprenticeship Term
Five periods of 1,800 hours

Length of In-School Training Program
Basic Program: 8 Weeks
Intermediate Program: 7 Weeks
Advanced Program: 7 Weeks

Basic Program

Course Designation	*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
PLUM 10	Plumbing I	9.5	21
MATH 10	Mathematics	1	2
ENG 10	English	0.5	2
PHYS 12	Applied Physics	0.5	1
DR 10	Drafting	1	2
WELD 10	Welding	0.5	2
		13	30

Intermediate Program

Course Designation	*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
PLUM 20	Plumbing II	9.5	21
MATH 20	Mathematics	1	2
ENG 20	English	0.5	2
PHYS 22	Applied Physics	0.5	1
DR 20	Drafting	1	2
WELD 20	Welding	3.5	2
		13	30

Advanced Program

Course Designation	*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
PLUM 30	Plumbing III	9	19
MATH 30	Mathematics	1	2
ENG 30	English	0.5	2
PHYS 32	Applied Physics	0.5	1
DR 37	Drafting	1	2
WELD 30	Welding	1	4
		13	30

Refrigeration and Air Conditioning/Ar76

Length of Apprenticeship Term
Five periods of 1,800 hours

Length of In-School Training Program
Basic Program: 8 Weeks
Intermediate Program: 7 Weeks
Advanced Program: 7 Weeks

Basic Program

Course Designation	*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
REF 10	Refrigeration and Air Conditioning I	9	21
MATH 10	Mathematics	1	2
ENG 10	English	1	2
PHYS 15	Applied Physics	0.5	1
DR 18	Drafting	1	2
WELD 10	Welding	0.5	2
		13	30

Intermediate Program

Course Designation	*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
REF 20	Refrigeration and Air Conditioning II	9	21
MATH 20	Mathematics	1	2
ENG 20	English	1	2
PHYS 25	Applied Physics	0.5	1
DR 28	Drafting	1	2
WELD 20	Welding	0.5	2
		13	30

Advanced Program

Course Designation	*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
REF 30	Refrigeration and Air Conditioning III	9	21
MATH 30	Mathematics	1	2
ENG 30	English	1	2
PHYS 35	Applied Physics	0.5	1
DR 38	Drafting	1	2
WELD 30	Welding	0.5	2
		13	30

Sheet Metal Mechanic/Ar77

Length of Apprenticeship Term
Five periods of 1,800 hours

Grade 12 Credit (See Information on Apprentice Programs)
200 hours in each period

Length of In-School Training Program
Basic Program: 8 Weeks
Intermediate Program: 7 Weeks
Advanced Program: 7 Weeks

Basic Program

Course Designation	Course Content	*Cr. Units per Session*	*Hrs. per Week*
SM 10	Sheet Metal Mechanic I	9.5	21
MATH 10	Mathematics	1	2
ENG 10	English	0.5	2
PHYS 13	Applied Physics	0.5	1
DR 10	Drafting	1	2
WELD 10	Welding	0.5	2
		13	30

Intermediate Program

SM 20	Sheet Metal Mechanic II	9.5	21
MATH 20	Mathematics	1	2
ENG 20	English	0.5	2
PHYS 23	Applied Physics	0.5	1
DR 20	Drafting	1	2
WELD 20	Welding	0.5	2
		13	30

Advanced Program

SM 30	Sheet Metal Mechanic III	9.5	21
MATH 30	Mathematics	1	2
ENG 30	English	0.5	2
PHYS 33	Applied Physics	0.5	1
DR 39	Drafting	1	2
WELD 11	Welding	0.5	2
		13	30

Steamfitting/Ar78

Length of Apprenticeship Term
Five periods of 1,800 hours

Grade 12 Credit (See Information on Apprentice Programs)
450 hours in each period

Length of In-School Training Program
Basic Program: 8 Weeks
Intermediate Program: 7 Weeks
Advanced Program: 7 Weeks

Basic Program

Course Designation	Course Content	*Cr. Units per Session*	*Hrs. per Week*
STEA 10	Steamfitting I	9.5	21
MATH 10	Mathematics	1	2
ENG 10	English	0.5	2
DR 10	Drafting	1	2
WELD 10	Welding	0.5	1.5
WELD 11	Welding	0.5	1.5
		13	30

Intermediate Program

STEA 20	Steamfitting II	9.5	21
MATH 20	Mathematics	1	2
ENG 20	English	0.5	2
DR 20	Drafting	1	2
WELD 20	Welding	0.5	1.5
WELD 21	Welding	0.5	1.5
		13	30

Advanced Program

STEA 30	Steamfitting III	10	22
MATH 30	Mathematics	1	2
ENG 30	English	0.5	2
DR 33	Drafting	1	2
WELD 30	Welding)		
WELD 31	Welding)	0.5	2
		13	30

Structural Steel Drafting/Ar79

Length of Apprenticeship Term
Three periods of 2,000 hours

Length of In-School Training Program
Basic Program: 8 Weeks
Intermediate Program: 7 Weeks
Advanced Program: 7 Weeks

Basic Program

Course Designation	Course Content	*Cr. Units per Session*	*Hrs. per Week*
STR 10	Structural Steel Drafting I	8	18
MATH 12	Mathematics	1.5	3
ENG 10	English	1	2
DR 11	Descriptive Geometry	2.5	7
		13	30

Intermediate Program

STR 20	Structural Steel Drafting II	8	18
MATH 22	Mathematics	1.5	3
ENG 20	English	1	2
DR 21	Descriptive Geometry	2.5	7
		13	30

Advanced Program

STR 30	Structural Steel Drafting III	8	18
MATH 32	Mathematics	1.5	3
ENG 30	English	1	2
DR 42	Descriptive Geometry	2.5	7
		13	30

Cement Mason/Ar80

Length of Apprenticeship Term
Three periods of 2,000 hours

Length of In-School Training Program
Basic Program: 7 Weeks
Intermediate Program: 7 Weeks
Advanced Program: 8 Weeks

Basic Program

Course Designation	Course Content	*Cr. Units per Session*	*Hrs. per Week*
CEM/ MAS 10	Cement Mason	6	17
MATH 10	Mathematics	1	2
ENG 10	English	2.5	5
DR 10	Drafting	1	2
PHYS 10	Applied Physics	1	2
CHEM 10	Chemistry	1	2
		12.5	30

Intermediate Program

CEM/ MAS 20	Cement Mason	6	17
MATH 20	Mathematics	1	2
ENG 20	English	2.5	5
DR 20	Drafting	1	2
PHYS 20	Applied Physics	1	2
CHEM 20	Chemistry	1	2
		12.5	30

Advanced Program

CEM/ MAS 30	Cement Mason	6	17
MATH 30	Mathematics	1	2
ENG 30	English	2.5	5
DR 30	Drafting	1	2
PHYS 30	Applied Physics	1	2
CHEM 30	Chemistry	1	2
		12.5	30

Glazier and Metal Mechanic/Ar81

Length of Apprenticeship Term
Four periods of 2,000 hours

Length of In-School Training Program
Basic Program: 7 Weeks
Intermediate Program: 7 Weeks
Advanced Program: 8 Weeks

Basic Program

Course Designation		Course Content	*Cr. Units per Session*	*Hrs. per Week*
GLAZ	10	Glazier and Metal Mechanic	8	20
MATH	10	Mathematics	1.5	3
ENG	10	English	1	2
DR	10	Drafting	1.5	3
PHYS	11	Applied Physics	1	2
			13	30

Intermediate Program

Course Designation		Course Content	*Cr. Units per Session*	*Hrs. per Week*
GLAZ	20	Glazier and Metal Mechanic	8	20
MATH	20	Mathematics	1.5	3
ENG	20	English	1	2
DR	20	Drafting	1.5	3
PHYS	21	Applied Physics	1	2
			13	30

Advanced Program

Course Designation		Course Content	*Cr. Units per Session*	*Hrs. per Week*
GLAZ	30	Glazier and Metal Mechanic	8	20
MATH	30	Mathematics	1.5	3
ENG	30	English	1	2
DR	30	Drafting	1.5	3
PHYS	31	Applied Physics	1	2
			13	30

AR-84

Heavy Construction

Dry Wall Tapers/Ar82–OMRP668

The emphasis in this course is directed toward the basic hand skill, mechanical procedures and trade techniques necessary for the development of competent mechanics within the taping field. The course is structured to prepare graduates to become employable within the Drywall industry and to meet the ever growing demands of this industry for skilled Drywall Tapers.

Applicants should be fairly robust and have the general physique necessary for employment in the Construction industry.

Length of Program: 8 Weeks

Admission Requirements: Grade 8 or equivalent

Course Designation		Course Content	*Cr. Units per Session*	*Hrs. per Week*
TA	130	Taping/Drywall	8.5	23
MATH	10	Mathematics	1.5	3
ENG	10	English	1	2
DR	131	Drafting and Blueprint Reading	1	2
			12	30

Blueprint Reading/Ar83–OMRP656

Blueprints supply the information required by a mechanic or tradesman so that he can understand the job on hand. Blueprint reading refers to the process of interpreting a print to form a mental picture of how the object looks when completed.

The mechanic or tradesman must develop an understanding of universal standards, symbols, signs and other techniques which the draftsman uses to describe a part, unit or mechanism.

This course is designed to assist the individual to understand the blueprints related to the various fields. Advancement in many companies depends on the ability to read blueprints. This course should enable a person to better his position in the area of his specialization.

Length of Program: 8 Weeks

Admission Requirements: Grade 10

Course Designation		Course Content	*Hrs. per Week*
DR	138	Blueprint Reading	25
ENG	16	English	2
MATH	16	Mathematics	3
			30

Business and Commerce

The George Brown College of Applied Arts and Technology

CONTINUING EDUCATION CONTINUING EDUCATION CONTINUING EDUCATION

Business and Commerce

Programs of Study

(A) Business Administration–2 Year Programs

These programs are designed for the student who seeks a broad, integrated education in the field of business as well as the opportunity to specialize in selected subject areas. They are of two years duration with starting dates in September and February.

All students will take a common first semester which will provide introductory courses in the three major program areas. At the end of this semester an area of concentrated study will be selected from one of Accounting, Marketing, or Electronic Data Processing.

Provision will also be made for the student who does not wish to specialize, but who prefers to follow a program in General Business.

In the second, third, and fourth semesters considerable scope will be provided in the selection of optional subjects to broaden the student's knowledge in business or other subject areas. A selection of options would include such courses as: Accounting, Marketing, Electronic Data Processing, Psychology, Credit and Collections, Business Finance, Advertising and Business Law.

Admission Requirements: Grade 12

Programs of Study
B1–B2–B3

Year 1/Semester I

Course Designation		Course Content	Cr. Units per Semester	Hrs. per Week
ENG	100	Language and Communications	5	5
MATH	114	Business Mathematics	5	5
EC	100	Economics	5	5
ACC	100	Introduction to Accounting	4	5
EDP	100	Introduction to Data Processing	4	5
MAR	100	Introduction to Marketing	4	5
			27	30

Major Programs

Accounting/B1

The courses included in this provide a valuable preparation for students interested in Accounting occupations in business and industry. It also offers preparatory training for students interested in working towards membership in one of the Professional Accounting Societies.

Course Designation	Course Content	Cr. Units per Semester	*Hrs. per Week*
Year 1/Semester II			
ENG 100	Language and Communication	5	5
MATH 114	Business Mathematics	5	5
BUS 100	Business Organization	5	5
ACC 101	Accounting	8	10
	Option	4	5
		27	30
Year 2/Semester I			
ENG 200	Language and Communication	5	5
LAW 200	Business Law	5	5
ACC 200	General Accounting I	4	5
ACC 201	Accounting Systems	4	5
ACC 202	Cost Accounting I	4	5
	Option	4	5
		26	30
Year 2/Semester II			
ENG 200	Language and Communication	5	5
ACC 203	General Accounting II	4	5
ACC 204	Cost Accounting II	4	5
ACC 205	Auditing and Taxation	4	5
	Option	8	10
		25	30

Electronic Data Processing/B2

The graduate of this program will be thoroughly trained in both the theoretical and practical applications of computers. The courses will be of particular interest to the student who is interested in a career as a Computer Programmer.

Note: Applicants may be required to take an aptitude test before being admitted to the program.

Course Designation	Course Content	Cr. Units per Semester	*Hrs. per Week*
Year 1/Semester II			
ENG 100	Language and Communication	5	5
MATH 114	Business Mathematics	5	5
BUS 100	Business Organization	5	5
EDP 101	Introduction to Computer Programming (Part A)	4	5
EDP 102	Introduction to Computer Programming (Part B)	4	5
	Option	4	5
		27	30
Year 2/Semester I			
ENG 200	Language and Communications	5	5
MATH 215	Statistics	5	5
EDP 200	Programming for Business Applications	8	10
ACC 207	Accounting	4	5
	Option	4	5
		26	30
Year 2/Semester II			
ENG 200	Language and Communications	5	5
EDP 201	Introduction to Systems	4	5
EDP 202	Programming Case Problems	8	10
	Options	8	10
		25	30

Marketing/B3

The graduate of the two year program is prepared for employment in Marketing and Merchandising with particular emphasis on Advertising, Sales, Planning, and Market Research. The course introduces those aspects of the marketing process deemed most suitable to provide a basis for a variety of positions, not only in marketing and merchandising, but also in various related areas of commerce.

Course Designation	Course Content	Cr. Units per Semester	*Hrs. per Week*
Year 1/Semester II			
ENG 100	Language and Communications	5	5
MATH 114	Business Mathematics	5	5
BUS 100	Business Organization	5	5
MAR 102	Marketing and the Consumer	8	10
	Option	4	5
		27	30
Year 2/Semester I			
ENG 200	Language and Communications	5	5
MATH 215	Statistics	5	5
MAR 200	Marketing and the Organization	8	10
MAR 201	Salesmanship	4	5
	Option	4	5
		26	30
Year 2/Semester II			
ENG 200	Language and Communications	5	5
MAR 202	Marketing and Distribution Channels (Advertising–7 hours) (Marketing–8 hours)	12	15
	Option	8	10
		25	30

Legal Secretarial Science/B40

This program provides the skills and knowledge required for successful entry into legal stenographic positions.

Candidates must have grade 12 or equivalent and a competence in shorthand of 80 wpm and 35 wpm in typewriting.

Length of Program: 1 Year

Admission Requirements: Grade *12 plus* 80 *wpm in shorthand and 35 wpm in typewriting*

Course Designation	Course Content	Cr. Units per Semester	*Hrs. per Week*
Semester I			
ENG 100	Language and Communication	5	5
LAW 105	Business Law	5	5
OP 102	Legal Office Practice	3	5
SH 102	Legal Shorthand	7	10
	Option	5	5
		25	30
Semester II			
ENG 100	Language and Communication	5	5
LAW 105	Business Law	5	5
OP 102	Legal Office Practice	3	5
SH 102	Legal Shorthand	7	10
	Option	5	5
		25	30

Medical Secretarial Science/B41

This program is designed to train medical stenographers and medical dictatypists for positions in their respective fields.

Candidates must have grade 12 or equivalent and a competence in shorthand of 80 wpm and 35 wpm in typewriting if entering the medical shorthand course. Entry to the medical dictaphone course would be grade 12 or equivalent and 45 wpm in typewriting.

Length of Program: 1 Year

Admission Requirements: Grade 12 *plus* 80 *wpm in shorthand and* 35 *wpm in typewriting, or* 45 *wpm in typewriting*

Semester I/Medical Shorthand

Course *Designation*	Course *Content*	Cr. *Units per Semester*	*Hrs. per Week*
ENG 100	Language and Communication	5	5
OP 103	Medical Office Practice	3	5
SH 103	Medical Shorthand	7	10
ANAT 100	Anatomy and Physiology	5	5
	Option	5	5
		25	30

Semester II/Medical Shorthand

Course *Designation*	Course *Content*	Cr. *Units per Semester*	*Hrs. per Week*
ENG 100	Language and Communication	5	5
OP 103	Medical Office Practice	3	5
SH 103	Medical Shorthand	7	10
ANAT 100	Anatomy and Physiology	5	5
	Option	5	5
		25	30

OR

Semester I/Medical Dictaphone

Course *Designation*	Course *Content*	Cr. *Units per Semester*	*Hrs. per Week*
ENG 100	Language and Communication	5	5
OP 103	Medical Office Practice	3	5
OP 104	Medical Dictaphone	4	8
ANAT 100	Anatomy and Physiology	5	5
ANAT 101	Medical Terminology	2	2
	Option	5	5
		24	30

Semester II/Medical Dictaphone

Course *Designation*	Course *Content*	Cr. *Units per Semester*	*Hrs. per Week*
ENG 100	Language and Communication	5	5
OP 103	Medical Office Practice	5	5
OP 104	Medical Dictaphone	4	8
ANAT 100	Anatomy and Physiology	5	5
ANAT 101	Medical Terminology	2	2
	Option	5	5
		26	30

Sales/B42

This program is for students who wish to make a career of selling. The graduate will be prepared for employment in all areas of commerce directly related to sales. Special studies include a course in Salesmanship designed to further the student's sales skills with strong emphasis on field conditions. Complementary academic subjects are also included in order that the student may acquire a broad understanding in areas indirectly related to sales. The program can be timetabled as a regular day program consisting of two consecutive semesters or arranged so that the student attends one semester at the College, works for a semester and returns to the College for a final semester.

Length of Program: 1 Year

Admission Requirements: Grade 12

Semester I

Course *Designation*	Course *Content*	Cr. *Units per Semester*	*Hrs. per Week*
ENG 110	Language and Communication	5	5
ENG 213	Oral Communications	2	2
MATH 114	Business Mathematics	5	5
PSY 201	Business Psychology	5	5
MAR 100	Marketing	5	5
MAR 101	Salesmanship	8	8
		30	30

Semester II

Course *Designation*	Course *Content*	Cr. *Units per Semester*	*Hrs. per Week*
ENG 212	Language and Communication	5	5
ENG 215	Advanced Communication Skills	2	2
MATH 115	Mathematics of Finance	5	5
EC 210	Economics	5	5
MAR 104	Advertising and Sales Promotion	5	5
MAR 101	Salesmanship	8	8
		30	30

General Secretarial Science/B43

The graduate of the one-year general secretarial program will have developed the skills in shorthand, typewriting and related areas necessary to meet the demands of a stenographic position.

Candidates must have grade 12 or equivalent—no previous knowledge of shorthand or typewriting is required.

Length of Program: 1 Year

Admission Requirements: Grade 12

Semester I

Course *Designation*	Course *Content*	Cr. *Units per Semester*	*Hrs. per Week*
ENG 100	Language and Communication	5	5
MATH 113	Business Mathematics	3	3
OP 100	Typewriting	4	7
SH 100	Shorthand (Pitman or Machine)	7	10
or			
SH 101			
	Option	5	5
		24	30

Semester II

Course *Designation*	Course *Content*	Cr. *Units per Semester*	*Hrs. per Week*
ENG 100	Language and Communication	5	5
OP 101	Typewriting and Office Practice	6	10
SH 100	Shorthand (Pitman or Machine)	7	10
or			
SH 101			
	Option	5	5
		23	30

Commercial Stenographic/B45-OMRP419

This program offers students an opportunity to acquire skills in Shorthand, Typewriting and Office Practice, and a knowledge of business English which will equip them to fill stenographic and secretarial positions in the world of business. The final objective of the stenographic course at this College is the acquisition by the student of the ability to produce a mailable transcript within a reasonable length of time from Shorthand dictation ranging from 80 to 120 wpm.

Length of Program: 40 Weeks

Admission Requirements: Grade 10 *or equivalent*

Semester I

Course *Designation*	Course *Content*	Cr. *Units per Semester*	*Hrs. per Week*
TYP 149	Typewriting	6	10
ENG 149	Language and Communication	5	5
SH 149	Shorthand	8	10
OP 149	Office Practice	3	5
		22	30

Semester II

Course *Designation*	Course *Content*	Cr. *Units per Semester*	*Hrs. per Week*
OP 150	Office Practice	6	5
SH 149	Shorthand	16	20
ENG 149	Language and Communication	5	5
		27	30

Business Machines and Bookkeeping B51-OMRP413

This course is designed to enable graduates to adequately fill the position of a general office worker in industry with a minimum of on the job training. The main accent is placed on bookkeeping. Practical work is given on a wide range of the newest and most modern equipment now available for office use, such as electronic bookkeeping machines, calculators, keypunch machines as well as data processing equipment. However, office methods and procedures are also thoroughly taught.

Length of Program: 40 Weeks

Admission Requirements: Grade 10 *or equivalent*

Semester I

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
BOK 148	Bookkeeping and Business Machines	12	18
MATH 148	Mathematics	4	4
LAW 148	Law and Economics	3	4
ENG 149	Business English	4	4
		23	30

Semester II/Part 1

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
TYP 148	Typewriting (Level 1)	9	13
BM 148	Business Machines	8	13
ENG 149	Business English	4	4
		21	30

Semester II/Part 2

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
TYP 148	Typewriting (Level 2)	9	13
EDP 148	Data Processing	9	13
OP 148	Office Practice and Duplicating	3	4
		21	30

Commercial Clerical/B52-OMRP417

This course exists to train the student in the performance of a variety of general office functions. The graduate is trained to assume a position as a clerk typist or a general clerical worker. The inclusion of Bookkeeping and Business Machines will also develop the necessary skills for work in a variety of Bookkeeping jobs.

Length of Program: 40 Weeks *(2–20 Week Semesters)*

Admission Requirements: Grade 8 or equivalent

Semester I

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
TYP 152	Typewriting	6	10
MATH 152	Mathematics	5	5
ENG 146	Language and Communication	5	5
BOK 152	Bookkeeping	4	5
BM 152	Business Machines	3	5
		23	30

Semester II

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
TYP 152	Typewriting	3	5
OP 152	Office Practice	3	5
MATH 152	Mathematics	5	5
ENG 146	Language and Communication	4	5
BOK 152	Bookkeeping	4	5
BM 152	Business Machines	5	5
		24	30

Clerk Typist (Special)/B53-OMRP415

The purpose of this course is to train the student, by a relatively short and intensive course to a skill level which will enable him to seek employment as a clerk typist. Preference will be given to women over 30 years of age.

Length of Program: 24 Weeks

Admission Requirements: Grade *10 or equivalent*

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
TYP 152	Typewriting	8	14
BOK 153	Bookkeeping	6	8
ENG 146	Language and Communications	4	4
MATH 152	Mathematics	4	4
		22	30

Commercial Accountancy/B54-OMRP416

This program will give the student a thorough grounding in the principles and practices of modern day Accounting. The graduate will be equipped to assume employment in any of a number of Accounting-oriented positions. This course can also lead to opportunities for further training in the field.

Length of Program: 40 Weeks

Admission Requirements: Grade 10 or equivalent

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
MATH 148	Mathematics	8	8
ENG 148	Language and Communications	7	7
ACC 154	Accounting	12	15
		27	30

Inventory Control-Warehouseman B55-OMRP426

This course is designed to prepare students for entry into the following fields of employment:

Setting up inventory control kardex systems, ordering of raw materials and finished assemblies, balancing inventories, forecasting sales and production, shipping and receiving, and warehousing.

Length of Program: 24 Weeks

Course Designation	*Course Content*	*Hrs. per Week*
INV 155	Inventory Control and Warehousing	22
TYP 155	Typewriting	3
MATH 156	Mathematics	5
		30

Commercial Refresher/B56-OMRP442

This course is designed for the student with a good background in commercial training and on the job experience, but who has not used this training for some years. Its purpose is to redevelop skills and knowledge to an employable level.

Length of Program: 16 Weeks

Admission Requirements: Previous commercial training and on the job experience

Course Designation	*Course Content*	*Hrs. per Week*
MATH 156	Mathematics	4
ENG 156	English	4
TYP 156	Typewriting and Office Practice	14
BOK 156	Bookkeeping	8
		30

Typist-General Office/B57-OMRP450

The aim of this concentrated course is to train selected students for employment as clerk typists by teaching them to type at a net speed of 45 to 50 wpm and by refreshing and further developing their clerical skills.

Length of Program: 16 Weeks

Admission Requirements:
a) Previous clerical experience
b) A fluency in English both oral and written

Session I

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
TYP 157	Typewriting and Office Practice	8	15
MATH 156	Mathematics	5	5
ENG 156	Language and Communications	5	5
BM 157	Business Machines	3	5
		21	30

Session II

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
TYP 157	Typewriting and Office Practice	12	20
MATH 156	Mathematics	5	5
ENG 156	Language and Communications	5	5
		22	30

Electronic Data Processing I/B70-OMRP618

(Keypunch and Verifier)

The purpose of this program is to train keypunch operators to a level of proficiency that they can graduate directly into positions in the field.

Length of Program: 4 Weeks

Admission Requirements: Grade 10 or equivalent, aptitude test, typing speed of 35 wpm

Course Designation		Course Content	Hrs. per Week
EDP	170	Keypunch	30

Electronic Data Processing II/B71-OMRP619

(Basic Unit Records)

The purpose of this course is to teach the students the general principles of Unit Record equipment with practice in wiring panels and problem solving. The graduate should be able to enter business with the familiarity and training to work effectively in Unit Records installations.

Length of Program: 8 Weeks

Admission Requirements: Grade 11 or equivalent plus bookkeeping and aptitude test

Course Designation		Course Content	Cr. Units per Semester	Hrs. per Week
EDP	171	Basic Unit Records	20	30

Electronic Data Processing III/B72-OMRP620

(Advanced Unit Records)

The purpose of this course is to equip the student with a sure knowledge of the operation of Unit Record equipment and sufficient practice that he may be able to function successfully as an operator immediately upon entering an installation. It is also designed to introduce the basics of computer operation, flowcharting and programming.

Length of Program: 8 Weeks

Admission Requirements: Successful completion of EDP II

Course Designation		Course Content	Hrs. per Week
EDP	172	Advanced Unit Records	30

Business Machines/B73-OMRP412

Purpose: To introduce the student to today's office machinery and to develop the qualities which are necessary to become a competent operator.

Length of Program: 12 Weeks

Admission Requirements: Grade 10 or equivalent

Course Designation		Course Content	Cr. Units per Semester	Hrs. per Week
BM	173	Business Machines	20	30

Typing/B74-OMRP443

To enable former office workers or previously trained typists to regain earlier skills to prepare for commercial employment.

Length of Program: 12 Weeks

Admission Requirements: Previous work experience in typing. Present typing skill, 15-20 wpm minimum

Course Designation		Course Content	Hrs. per Week
TYP	158	Typing	15
ENG	156	Language and Communications	6
OP	158	Office Practice	3
BM	158	Business Machines	6
			30

Electrical/ Electronics

The George Brown College of Applied Arts and Technology

Electrical/Electronic Programs of Study

Design Technician/El1 Electrical

This course is designed to train design technicians in the field of Electricity and Electronics. The training combines an adequate theoretical base, practical knowledge, and workshop skills to provide a background for Drafting. In the second year the student selects either the Electronic or Electrical Option to provide design specialization. Electrical/Electronic Design Technicians are employed by Local, Provincial and Federal Government Departments, Municipal and Provincial Hydro-electric Systems, Manufacturing Companies, Consulting Engineering Firms and Construction Companies.

Length of Program: 2 Years

Admission Requirements: Grade 12

First Year

Course Designation		Course Content	*Cr. Units per Semester*	*Hrs. per Week*
DR	103	Electrical Design Drafting	5	8
DR	112	Architectural Drafting	2	3
DR	111	Mechanical Drafting	1	2
EL	112	Electrical Laboratory	1	3
MATH	100	Mathematics	3	4
ENG	100	Language and Communication	2	2
EL	110	Electrical Fundamentals and Problems	4	4
ELTC	100	Electronic Fundamentals and Problems	3	3
EL	120	Materials and Methods	2	2
			23	31

Second Year (Electrical Option)

Course Designation		Course Content	Cr. Units per Semester	Hrs. per Week
DR	227	Electrical Design Applications	4	6
EL	204	Electrical Machines	3	4
EL	205	Power and Distribution	3	3
EL	202	Electrical Laboratory	4	6
EC	102	Engineering Law and Administration	2	2
MATH	200	Mathematics	4	4
ENG	200	Language and Communication	2	2
PHYS	100	Applied Physics	3	3
			25	30

Electrical Technician/El2

This course is designed to provide the theory, skills and knowledge of industrial practices required of an electrical technician. Facilities include modern labs and equipment which reinforce electrical theory with practical experience. Opportunities for employment are found in electrical generation and distribution, communications, manufacturing, and building fields. Graduates are employed as draftsmen, servicemen, estimators, operators, and inspectors.

Length of Program: 2 Years

Admission Requirements: Grade 12

First Year

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
EL 101	Electrical Measurements	1.5	1
EL 102	DC Machines	4	4
EL 103	Electrical Lab	4	8
EL 104	Electrical Fundamentals	5	5
MATH 100	Mathematics	4	4
ENG 100	Language and Communication	2	2
MECH 102	Mechanics	3	3
DR 122	Electrical Drafting	1.5	3
		25	30

Second Year

EL 200	AC Machines	4	3.5
EL 205	Power and Distribution	2	2
EL 206	Industrial Electronic Control	4	3.5
EL 207	Electrical Lab	4	8
MATH 200	Mathematics	4	4
ENG 200	Language and Communication	2	2
PHYS 100	Applied Physics	2	3
EC 110	Economics	2	2
DR 203	Electrical Drafting	1	2
		25	30

Electronic Technician/El3

This course is designed to provide Engineering Technicians to work in the maintenance, installation production, design or research phases of the electronics industry. In order to better qualify the student of this course for immediate productive work in industry upon graduation, the course has been designed about a common first year and a second year which allows the student to specialize in an area of greatest interest to him. The areas of specialization are: Communications, Computers, and ETV/TV Broadcast. The Electronics Technician Program is intensive and the student must apply himself consistently; however, to assist the student and to make his program meaningful, the College is well supplied with laboratory space, modern test equipment and examples of commercial electronic units for "hands on" applications experience. Graduates of this course are now employed in research and engineering departments of government and industry, in utility companies, in radio and television broadcasting, in closed circuit television studios, in the oil industry and in computer and communications systems installation.

Length of Program: 2 Years

Admission Requirements: Grade 12

First Year

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
EL 100	Electrical Fundamentals	2	3
ELTC 100	Electronic Fundamentals	2	3
ELTC 101	Amplifiers	2	3
ELTC 102	AM/FM Receiver Circuits	2	3
ELTC 103	Semi-Conductor Circuits	3	3
ELTC 105	TV Principles	2	3
DR 116	Drafting	1.5	2
MATH 100	Mathematics	4	4
ENG 100	Language and Communication	2	2
MECH 102	Mechanics	2	2
PHYS 100	Applied Physics	3	3
		25.5	31

Note: For those taking the ETV and TV Broadcast option, there will be a 40 hour introductory TV Broadcast course at the end of the first year. This non-credit course is intended as a preparatory course for summer employment.

ELTC 106 Introductory TV Broadcast

Second Year

1. Area of Specialization—Communications Engineering Technician

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
ELTC 200	Transistors	1.5	1.5
ELTC 201	Pulse Circuits	1.5	1.5
ELTC 202	Computer Principles	1.5	1.5
ELTC 203	Communications Principles	1.5	1.5
ELTC 212	Communications Systems	3	3
ELTC 213	Laboratory	5	10
MATH 200	Mathematics	4	4
ENG 200	Language and Communications	2	2
PHYS 200	Modern Physics	3	3
EC 100	Economics	2	2
		25	30

2. Area of Specialization—Computer Engineering Technician

ELTC 200	Transistors	1.5	1.5
ELTC 201	Pulse Circuits	1.5	1.5
ELTC 202	Computer Principles	1.5	1.5
ELTC 203	Communications Principles	1.5	1.5
ELTC 211	Computer Systems	3	3
ELTC 213	Laboratory	5	10
MATH 200	Mathematics	4	4
ENG 200	Language and Communications	2	2
PHYS 200	Modern Physics	3	3
EC 100	Economics	2	2
		25	30

3. Area of Specialization—ETV and TV Broadcast Engineering Technician

ELTC 200	Transistors	1.5	1.5
ELTC 201	Pulse Circuits	1.5	1.5
ELTC 213	Laboratory	5	10
ELTC 215	Audio Systems Theory and Equipment	1	1
ELTC 216	Video Systems and Transmitting Systems Theory and Equipment	2	2
ELTC 217	TV Camera, Tape Recorders and Telecine Theory and Equipment	2	2
ELTC 218	Test Equipment Theory and Practice	1	1
MATH 200	Mathematics	4	4
ENG 200	Language and Communications	2	2
PHYS 200	Modern Physics	3	3
EC 100	Economics	2	2
		25	30

Electronics/El41-OMRP674

The theory in this course is developed so that the principles involved in various circuits, modules and systems can be applied to all types of electronic equipment both domestic and commercial. To complement the theory, practical sessions in the laboratory are given on domestic equipment such as the radio, television, hi-fi and the record changer. With this background the graduate of this course is equipped to work effectively as a service technician in all electronic manufacturing companies, retail radio and television stores and in the small radio and television repair shop.

Length of Program: 1 Year (48 Weeks)

Admission Requirements: Grade 10

Semester I

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
ELTC 130	Electrical and Electronic Fundamentals	4	4
ELTC 131	Semi-Conductors Devices and Circuits	4	4
ELTC 132	Radio-Hi Fi, and Sound Systems	3	3
ELTC 133	Fundamentals Laboratory	5	10
DR 133	Electronic Drafting	1.5	2
MATH 131	Mathematics	3	3
PHYS 131	Physics	2	2
ENG 130	Language and Communications	2	2
		24.5	30

Semester II

ELTC 134	Pulse and Digital Circuits	2	2
ELTC 135	Television Receiver Circuits and Systems	4	4
ELTC 136	Color Television and F.M. Multiplex	4	4
ELTC 137	Radio and Television Laboratory	5.5	11
DR 133	Electronics Drafting	1.5	2
MATH 131	Mathematics	3	3
PHYS 131	Physics	2	2
ENG 130	Language and Communication	2	2
		24	30

Radio and Television (Apprentice)/EI42

Length of Apprenticeship Term
Four periods of 2,000 hours

Length of In-School Training Program
First Year: 18 Weeks
Second Year: 18 Weeks

First Year

Course Designation	Course Content	*Cr. Units per Semester*	*Hrs. per Week*
ELTC 130	Electrical Fundamentals	4	4
ELTC 131	Electronic Fundamentals	4	4
ELTC 132	Radio and Sound Servicing	3	3
ELTC 133	Fundamentals Laboratory	5	10
DR 133	Drafting	1.5	2
MATH 131	Mathematics	3	3
PHYS 131	Physics	2	2
ENG 10	Language and Communication	2	2
		24.5	30

Second Year

Course Designation	Course Content	*Cr. Units per Semester*	*Hrs. per Week*
ELTC 134	Pulse Circuits	2	2
ELTC 135	Television Circuits	4	4
ELTC 136	Color Television and FM Multiplex	4	4
ELTC 137	Radio and Television Laboratory	5.5	11
DR 133	Drafting	1.5	2
MATH 131	Mathematics	3	3
PHYS 131	Physics	2	2
ENG 20	Language and Communication	2	2
		24	30

Electrical Construction/EI70

Length of Apprenticeship Term
Five periods of 1,800 hours

Grade 12 Credit (See Information on Apprentice Programs)
200 hours in each period

Length of In-School Training Program
Basic Program: 7 weeks, conducted during the first or second apprenticeship period.
Intermediate Program: 7 weeks, 2nd or 3rd period.
Advanced Program: 8 weeks, conducted during fourth apprenticeship period.
Industrial Electronics Program: 7 weeks, conducted during fifth apprenticeship period. All apprentices graduating from the advanced course have the opportunity of taking this course on a voluntary basis.

Basic Program

Course Designation	Course Content	*Cr. Units per Session*	*Hrs. per Week*
EL 10	Electrical Construction I	7	14
EL 11	Electrical Practice	2	8
MATH 10	Mathematics	2	3
ENG 10	English	1	2
DR 12	Drafting and Blueprint Reading	1	3
		13	30

Intermediate Program

Course Designation	Course Content	*Cr. Units per Session*	*Hrs. per Week*
EL 20	Electrical Construction II	7	14
EL 21	Electrical Practice	2	8
MATH 20	Mathematics	2	3
ENG 20	English	1	2
DR 22	Drafting and Blueprint Reading	1	3
		13	30

Advanced Program

Course Designation	Course Content	*Cr. Units per Session*	*Hrs. per Week*
EL 30	Electrical Construction III	7	14
EL 31	Electrical Practice	2	8
MATH 30	Mathematics	2	3
ENG 30	English	1	2
DR 32	Blueprint Reading	1	3
		13	30

Industrial Electronic Program (Elective)

Course Designation	Course Content	*Cr. Units per Session*	*Hrs. per Week*
EL 40	Industrial Electronic Controls	4	7
EL 41	Electrical Practice	7	19
WELD 11	Welding	2	4
		13	30

Engineering Technology

The George Brown College of Applied Arts and Technology

CONTINUING EDUCATION CONTINUING EDUCATION CONTINUING EDUCATION

Engineering Technology
Programs of Study

Instrumentation Technician/En1

The increasing use of automation and automatic processes has resulted in the growth of the specialized field of instrumentation. The instrumentation technician is concerned with measurement and control devices used with complex automatic systems. The program of study presents theory and knowledge of these devices and is aimed at developing technicians who work precisely. College facilities include shops and laboratories which feature a wide range of modern precision equipment.

Instrumentation technicians are employed in government departments, universities, manufacturing plants, primary industries and research and development companies.

Arrangements may be made for students who are progressing satisfactorily to study Instrumentation courses beyond those included in this program. Note the information shown after Semester II of the second year program of study.

Length of Program: 2 Years

Admission Requirements: Grade 12

First Year/Semester I

Course Designation		Course Content	*Cr. Units* per Semester	*Hrs. per* Week
INST	100	Measuring Principles	7	10
INST	103	Piping and Instrument Lab Techniques	3	4
EL	100	Electrical Fundamentals	3	4
ENG	100	Language and Communication	2	2
MATH	100	Mathematics	4	4
MECH	102	Mechanics	3	3
DR	100	Technical Drawing	2	3
			24	30

Semester II

Course Designation		Course Content	*Cr. Units* per Semester	*Hrs. per* Week
INST	101	Electronic Instrumentation	6	9
INST	104	Telemetering	4	5
or				
INST	105	Applied Nuclear Theory	4	5
EL	100	Electrical Fundamentals	3	4
ENG	100	Language and Communication	2	2
MATH	100	Mathematics	4	4
*MECH	102	Mechanics	1.5	3
*PHYS	100	Applied Physics	1.5	3
DR	100	Technical Drawing	2	3
			24	30

*MECH 102 ends mid-March, PHYS 100 begins mid-March

Second Year/Semester I

Course Designation	Course Content	*Cr. Units per Semester*	*Hrs. per Week*
INST 200	Automatic Control Principles I	5	7
INST 201	Final Control Elements	3	5
ELTC 100	Electronics Fundamentals	3	4
ENG 200	Language and Communication	2	2
MATH 200	Mathematics	4	4
PHYS 100	Applied Physics	3	3
EC 100	Economics	2	2
CHEM 100	Chemistry	2	3
		24	30

Semester II

Course Designation	Course Content	*Cr. Units per Semester*	*Hrs. per Week*
INST 202	Analytical Instrumentation	3	4
INST 203	Computer Control Principles I	6	8
ELTC 100	Electronic Fundamentals	3	4
ENG 200	Language and Communication	2	2
MATH 200	Mathematics	4	4
*PHYS 100	Applied Physics	1.5	3
*INST 204	Industrial Preparation	1	2
EC 100	Economics	2	2
CHEM 100	Chemistry	2	3
		24.5	30

*PHYS 100 ends mid-March, INST 204 begins
INST 203, 9 hrs/wk. beginning mid-March

Additional credits will be offered to enable a student to qualify for certification as an INSTRUMENT TECHNOLOGIST.

Requisite Courses

MATH 306 Mathematics
MATH 307 Mathematics
INST 301 Computer Control Principles II
INST 300 Automatic Control Principles II
INST 104 Telemetering
or (whichever course not taken previously)
INST 105 Applied Nuclear Theory

Electives

Plus two additional Elective courses. These courses will be subject to the approval of the Programme Chairman.

Plastics Theory and Techniques Technician A/En2

The plastics department offers several programs of study in the processing, fabricating, and finishing of plastic materials. Facilities include shops, labs, and advanced equipment used in research.

In Canada, the growth rate of the plastics industry is more than double the industrial average. Over 1,100 companies are engaged in plastics; more than 600 of these firms are in Ontario. This rapid expansion has created a strong demand for technicians at several levels.

Technician A is a two-year program requiring grade 12 with Physics, Chemistry, and Drafting.

Length of Program: 2 Years

First Year

Course Designation	Course Content	*Cr. Units per Semester*	*Hrs. per Week*
PL 100	Thermoplastic Materials	3	3
PL 103	Thermoset Materials	2	2
PL 110	Thermoplastic Processes	3	4
PL 113	Thermoset Processes	2	3
PL 120	Thermoplastic Design	3	3
PL 123	Thermoset Design	2	2
CHEM 110	Chemistry	3	4
PHYS 110	Physics	2	2
ENG 100	Language and Communication	2	2
MATH 100	Mathematics	4	4
EC 112	Business Organization	1	1
		27	30

Second Year

Course Designation	Course Content	*Cr. Units per Semester*	*Hrs. per Week*
PL 200	Thermoplastic Materials	3	3
PL 203	Thermoset Materials	2	2
PL 210	Thermoplastic Processes	3	4
PL 211	Thermoset Processes	2	3
PL 220	Thermoplastic Design	3	3
PL 223	Thermoset Design	2	2
CHEM 210	Chemistry	3	4
PHYS 210	Physics	2	2
ENG 200	Language and Communication	3	3
MATH 201	Mathematics	3	3
EC 212	Business Organization	1	1
		27	30

Plastics Theory and Techniques Technician B

Technician B is a one-year program requiring Grade 12 with Physics, Chemistry and Drafting. At this level, programs are offered which specialize in either Thermoplastics or Thermosets.

Plastics Theory and Techniques, Technician "B" Thermoset/En49

Length of Program: 1 Year

Course Designation	Course Content	*Cr. Units per Semester*	*Hrs. per Week*
PL 103 PL 203	Thermoset Materials	4	5
PL 113 PL 211	Thermoset Processes	4	8
PL 123 PL 223	Thermoset Design	4	4
CHEM 110	Chemistry	3	4
PHYS 110	Physics	2	2
ENG 100	Language and Communication	3	3
MATH 100	Mathematics	4	4
EC 112	Business Organization	1	1
		25	31

Plastics Theory and Techniques, Technician "B" Thermoplastic/En50

Length of Program: 1 Year

PL 100 PL 200	Thermoplastic Materials	5	5
PL 110 PL 210	Thermoplastic Processes	5	7
PL 120 PL 220	Thermoplastic Design	5	5
CHEM 110	Chemistry	3	4
PHYS 110	Physics	2	2
ENG 100	Language and Communication	3	3
MATH 100	Mathematics	4	4
EC 112	Business Organization	1	1
		28	31

Tool and Die Design/En3

The aim of the Tool and Die Design Program is to develop the necessary theoretical and practical skills. The student studies and practices current design techniques. Through consideration of the factors which affect the efficacy of designed tools, he is encouraged to be imaginative, individualistic and critically analytical in seeking possible solutions to design and production problems. The student is taught the operating procedures and capacities of a variety of production and specialized machine tools. He studies Mathematics, Metallurgy, Metrology, Mechanics of Materials, so that his designs may be functional. In the course of his daily work routine, the designer is involved in liaison work between many company departments so that the study of language and communications is extremely important.

For the enterprising graduate, prospects of advancement exist in Production, Manufacturing and Industrial Engineering.

It should be noted that Toolmaking Technician and Tool Design Technician students undertake a common first year program so that they may have the choice of specializing in either area during the second year.

Length of Program: 2 Years

Admission Requirements: Grade 12 of a 4 or 5 year program *which includes* Physics, Chemistry, *and* Mathematics. *Drafting and shop options would be an asset*

First Year

Course Designation	Course Content	*Cr. Units per Semester*	*Hrs. per Week*
TD 100	Jig and Fixture Design I	2.5	3.5
TD 101	Jig and Fixture Design II	2.5	4
TD 102	Jig and Fixture Design III	1	1
TD 103	Jig and Fixture Design IV	1	1
MACH 120	Jigs and Fixtures I	1.5	2
MACH 121	Jigs and Fixtures II	1.5	2
MACH 122	Gauges	1.5	2.5
MACH 123	Diemaking	1.5	2
WELD 145	Welding	1	1
WELD 146	Welding		
TD 110	Metrology	2	2
MATH 100	Mathematics	4	4
MECH 100	Mechanics	3	3
ENG 100	Language and Communication	2	2
		25	30
PHYS 100	Physics Elective	2	2
EL 105	Electrical Fundamentals Elective	2	2
CHEM 100	Chemistry Elective	2	3

Second Year

Course Designation	Course Content	Cr. Units per Semester	Hrs. per Week
TD 200	Die Design I	3	4
TD 201	Die Design II	3	4
TD 202	Die Design III	3	4
PL 125	Plastics Fundamentals	2	2
DR 118	Descriptive Geometry	2	3
MACH 207	Diemaking	2	4
MET 100	Metallurgy	2	2
MATH 200	Mathematics	4	4
MECH 110	Mechanics of Materials	2	2
ENG 200	Language and Communication Options	2	2
		25	31
EC 100	Economics Elective	2	2
CHEM 100	Chemistry Elective	2	3
EL 105	Electrical Fundamentals Elective	2	2
PHYS 100	Physics Elective	2	2
TD 204	Process Engineering Elective	2	2
TD 206	Quality Control Elective	2	2

Toolmaking Technician/En4

On the Toolmaking Technician program, the student can obtain the theoretical knowledge and operating skills necessary to enable him to enter a toolroom at a junior level. Instruction is provided on standard machine tools and in current techniques such as numerical control. Related courses are offered to complement instruction in the major subject area. The graduate can look forward to a vital and interesting career in the modern production process, a career which demands skill, application, accuracy and cost-consciousness.

Toolmaking Technician and Tool and Die Design Technician students undertake a common first year program so that they may have the choice of specializing in either area during the second year.

Length of Program: 2 Years

Admission Requirements: Grade 12 of a 4 or 5 year program which includes Physics, Chemistry and Mathematics. Machine Shop or Drafting options would be an asset

First Year

Course Designation	Course Content	Cr. Units per Semester	Hrs. per Week
TD 100	Jig and Fixture Design I	2.5	3.5
TD 101	Jig and Fixture Design II	2.5	4
TD 102	Jig and Fixture Design III	1	1
TD 103	Jig and Fixture Design IV	1	1
MACH 120	Jigs and Fixtures I	1.5	2
MACH 121	Jigs and Fixtures II	1.5	2
MACH 122	Gauges	1.5	2.5
MACH 123	Diemaking	1.5	2
WELD 145	Welding	1	1
WELD 146	Welding		
TD 110	Metrology	2	2
MATH 100	Mathematics	4	4
MECH 100	Mechanics	3	3
ENG 100	Language and Communication	2	2
		25	30
PHYS 100	Physics Elective	2	2
EL 105	Electrical Fundamentals Elective	2	2
CHEM 100	Chemistry Elective	2	2

Second Year

MACH 203	Special Machine Techniques	2	3
MACH 204	Diemaking I	2	3
MACH 205	Diemaking II	2	3
MACH 206	Diemaking III	2	3
MACH 208	Numerical Control	2	2
PL 125	Plastics Fundamentals	2	2
TD 205	Die Design	2	4
MET 100	Metallurgy	2	2
MATH 200	Mathematics	4	4
MECH 110	Mechanics of Materials	2	2
ENG 200	Language and Communication Options	2	2
		24	30
EC 100	Economics Elective	2	2
CHEM 100	Chemistry Elective	2	2
EL 105	Electrical Fundamentals Elective	2	2
PHYS 100	Physics Elective	2	2
TD 204	Process Engineering Elective	2	2
TD 206	Quality Control Elective	2	2

Machine and Product Design/En5

Machines, mechanical devices, and products of greatly sophisticated design are characteristic of modern industry. The design drawings, schematics, detail drawings, and assembly drawings for these machines and products are drawn by machine design or product design draftsmen. Through this program the student can gain the theoretical and practical knowledge which is required by draftsmen in manufacturing companies and other industrial organizations in the general mechanical field.

Graduates may be employed as draftsmen, designers, process planners, salesmen, or estimators by manufacturing industries, consulting engineers and government departments.

Length of Program: 2 Years

Admission Requirements: Grade 12 of a 4 or 5 year program which includes Physics, Chemistry, and Mathematics. Drafting and shop options would be an asset

First Year

Course Designation	Course Content	Cr. Units per Semester	Hrs. per Week
DR 101	Machine Drawing and Design	8	11
MACH 110	Workshop Technology	2	4
DR 118	Descriptive Geometry	3	4
MATH 100	Mathematics	4	4
ENG 100	Language and Communication	2	2
MECH 100	Mechanics	3	3
MET 100	Metallurgy	2	2
		24	30
EC 100	Economics Elective	2	2
EL 105	Electrical Fundamentals Elective	2	2
CHEM 100	Chemistry Elective	2	3

Second Year

DR 201	Drawing and Product Design	6	8
MACH 201	Manufacturing Processes	2	4
DR 207	Kinematics	3	4
DR 222	Descriptive Geometry	3	4
MATH 200	Mathematics	4	4
PHYS 100	Applied Physics	2	2
MECH 110	Mechanics of Materials	2	2
ENG 200	Language and Communication Option	2	2
		24	30
EC 100	Economics Elective	2	2
EL 105	Electrical Fundamentals Elective	2	2
CHEM 100	Chemistry Elective	2	2
TD 204	Process Engineering Elective	2	2
TD 206	Quality Control Elective	2	2

Process Piping Design/En6

Pipes are the arteries and veins of any modern, industrial community. Fluids and semi solids, essential to our existence as a highly industrialized society, are carried by pipes during their production, processing, transportation and utilization.

Future developments in atomic energy, rocket propulsion, petrochemicals, food and drug production, cryogenics and pollution control, are creating demands for more sophisticated piping techniques. This challenge will require the services of highly skilled technicians and draftsmen.

The program is designed to prepare graduates for employment as technicians, draftsmen and estimators by consulting and design engineers, public utilities and manufacturing industries.

Length of Program: 2 Years

Admission Requirements: Grade 12 of a 4 or 5 year program which includes Physics, Chemistry and Mathematics. Drafting and shop options would be an asset

First Year

Course Designation	Course Content	Cr. Units per Semester	Hrs. per Week
DR 104	Pipe Drafting and Design	7	10
MATH 100	Mathematics	4	4
DR 118	Descriptive Geometry	3	4
ENG 100	Language and Communication	2	2
MECH 100	Mechanics	3	3
DR 115	Structural Drafting	2	3
MET 100	Metallurgy	2	2
PHYS 100	Applied Physics	2	2
		25	30
EL 105	Electrical Fundamentals Elective	2	2
EC 100	Economics Elective	2	2
INST 103	Piping and Instrumentation Lab.	2	3

Second Year

DR 204	Design and Layout of Piping Systems	8	10
MATH 200	Mathematics	4	4
DR 222	Descriptive Geometry	3	4
ENG 200	Language and Communication Options	2	2
CHEM 100	Chemistry	2	3
DR 225	Materials and Processes	2	2
EN 107	Mechanics of Fluids	2	2
INST 106	Industrial Process Instrumentation	2	3
		25	30

Materials Handling Design/En7

Increasing automation and the application of modern packaging and handling techniques resulted in the development of the specialized field of materials handling design. The plant layouts, estimates, schematics, assembly and detail drawings of handling equipment and systems are produced by designers and draftsmen trained in the many facets of materials handling design. This program provides the student with theoretical and practical knowledge sufficient to enable him to enter the materials handling design field.

Graduates may be employed as draftsmen, designers, salesmen, estimators or planners by processing and manufacturing plants, consulting engineers, primary industries and research and development companies.

Length of Program: 2 Years

Admission Requirements: Grade 12 of a 4 or 5 year program which includes Physics, Chemistry, and Mathematics. Drafting and shop options would be an asset

First Year

Course Designation		Course Content	Cr. Units per Semester	Hrs. per Week
DR	123	Engineering Drawing and Design	7	10
DR	115	Structural Drafting	2	3
DR	118	Descriptive Geometry	3	4
MECH	100	Mechanics	3	3
EL	106	Electrical and Electronic Fundamentals	2	2
PHYS	100	Physics	2	2
MATH	100	Mathematics	4	4
ENG	100	Language and Communication	2	2
			25	30

Second Year

Course Designation		Course Content	Cr. Units per Semester	Hrs. per Week
DR	212	Plant Layout and Handling Systems	7	10
DR	207	Kinematics	3	4
DR	222	Descriptive Geometry	2	3
MECH	110	Mechanics of Materials	2	2
TD	207	Industrial Engineering	2	2
INST	107	Applied Control Theory	2	3
MATH	200	Mathematics	4	4
ENG	200	Language and Communication	2	2
		Options		
			24	30
EC	100	Economics Elective	2	2
CHEM	100	Chemistry Elective	2	2
EN	107	Mechanics of Fluids	2	2

Materials Evaluation/En8

The evaluation of materials used in a product is an important aspect of production. This evaluation is carried out by testing departments of major manufacturing companies and by private and government laboratories. The Materials Evaluation program provides training in methods of destructive and non-destructive testing which are most commonly used. The program has been designed so that the graduate will be able to apply for government certification in industrial radiography and ultrasonic testing once he has completed the work experience requirements.

The graduate will be prepared for employment in the materials testing, quality control and inspection departments of automotive and power generating equipment manufacturers, steel producing and pipeline companies, nuclear construction, and aircraft overhaul and manufacturing companies.

Length of Program: 2 Years

Admission Requirements: Grade 12 of the 4 or 5 year program with Mathematics, Physics and Chemistry

First Year/Semester I

Course Designation		Course Content	Cr. Units per Semester	Hrs. per Week
MAT	100	Materials Science	4	7
TEST	100	Elements of Testing	2	4
DR	100	Technical Drawing	2	3
MECH	100	Mechanics	6	6
MATH	100	Mathematics	4	4
PHYS	103	Physics	2	3
ENG	100	Language and Communication	2	2
TD	110	Metrology	2	2
			24	31

Semester II

Course Designation		Course Content	Cr. Units per Semester	Hrs. per Week
MAT	100	Materials Science	4	7
TEST	100	Elements of Testing	4	6
DR	100	Technical Drawing	2	3
MATH	100	Mathematics	4	4
PHYS	103	Physics	2	3
ENG	100	Language and Communication	2	2
MECH	110	Mechanics of Materials	4	4
			22	31

Second Year

Course Designation		Course Content	Cr. Units per Semester	Hrs. per Week
TEST	200	Testing Techniques	11	17
MATH	200	Mathematics	4	4
MAT	200	Materials Science	3	5
ELTC	110	Electronic Fundamentals	2	2
ENG	200	Language and Communication	2	2
			22	30

Coatings Technician/En9

This program has been designed in conjunction with representative committees of the paint and coatings industry to prepare students to enter technical, production, sales and junior management areas of the industry. After a minimum of two years' industrial experience, the graduate will be eligible to apply to the Paint Industry Education Bureau for recognition as a "Paint Technologist".

Length of Program: 2 Years

Admission Requirements: Grade 12 of the 4 or 5 year program with Mathematics, Physics and Chemistry

Coatings Technology

First Year/Semester I

Course Designation		Course Content	Cr. Units per Semester	Hrs. per Week
CHEM	110	Chemistry	6	8
CHEM	111	Analytical Chemistry	3	4
CHEM	112	Industrial Chemistry	3	4
COAT	100	Basic Paint Technology	4	6
MATH	100	Mathematics	4	4
PHYS	100	Physics	2	2
ENG	100	Language and Communication	2	2
			24	30

Semester II

Course Designation		Course Content	Cr. Units per Semester	Hrs. per Week
CHEM	113	Organic Chemistry	3	4
CHEM	111	Analytical Chemistry	3	4
CHEM	112	Industrial Chemistry	3	4
COAT	100	Basic Paint Technology	7	10
MATH	100	Mathematics	4	4
PHYS	100	Physics	2	2
ENG	100	Language and Communication	2	2
			24	30

Second Year

Course Designation		Course Content	Cr. Units per Semester	Hrs. per Week
COAT	200	Paint Manufacture and Testing	3	6
COAT	201	Resins	2	3
COAT	202	Pigments	2	3
COAT	203	Solvents	2	2
COAT	204	Oils and Driers	2	2
CHEM	210	Polymer Chemistry	3	4
CHEM	212	Industrial Chemistry	2	2
MATH	200	Mathematics	4	4
MAT	101	Materials Science	2	2
ENG	200	Language	2	2
			24	30

Orthotic/Prosthetic Techniques/En10

In the rehabilitation of the disabled, the orthotist designs and fits orthopaedic braces to support weakened body parts or to correct body defects, and the prosthetist designs and fits artificial limbs. In each case orthotic/prosthetic technicians construct the appliances and modify and improve the design in consultation with the orthotist and prosthetist.

The graduate of the two year orthotic/prosthetic techniques program will receive a background in materials, fabrication methods, anatomy, biomechanics, design and shop practice to allow him to find employment as a technician in private establishments or government rehabilitation centres.

The graduate of the three year orthotic/prosthetic techniques program will undertake additional special studies in advanced anatomy, physiology, pathology, rehabilitation, physical therapy and occupational therapy such that after a two year internship he will be able to apply for certification as a registered prosthetist or orthotist.

The prospective student for this program should have an interest in materials, the use of manual skills as well as machine tools and be of an inventive nature, since this is one field where modern technology is constantly changing the basis of the design and operation of artificial limbs. (The simple mechanical limb is being replaced with the servo operated limb and eventually the limb may be operated via the nerve endings previously controlling the real limb). Lastly and of prime importance the prospective student should have a sense of real concern for the welfare of the disabled.

Length of Program:
Orthotic/Prosthetic Technician: 2 Years
Orthotist/Prosthetist: 3 Years *(plus internship)*

Admission Requirements: Grade 12 of the 4 or 5 year program with Chemistry, Physics and preferably some shop experience

First Year

Course Designation	Course Content	Cr. Units per Semester	Hrs. per Week
MED 100	Introductory Anatomy and Biomechanics	5	5
PROS 100	Introductory Orthopaedics	2	2
PROS 101	Materials and Shop Techniques	6	11
DR 100	Technical Drawing	2	3
MECH 100	Mechanics	3	3
MET 100	Metallurgy	2	2
MATH 107	Mathematics	2	2
ENG 100	Language and Communication	2	2
		24	30

Electives

Course Designation	Course Content	Cr. Units per Semester	Hrs. per Week
CHEM 100	Chemistry Elective	2	3
EL 105	Electrical Fundamentals Elective	2	2

Second Year/Semester I

Course Designation	Course Content	Cr. Units per Semester	Hrs. per Week
MED 200	Intermediate Anatomy	4	4
MED 201	Introductory Physiology	2	2
MED 202	Introductory Pathology	1	1
PSY 202	Psychology	2	2
PROS 200	Orthotic and Prosthetic Techniques	5	9
PROS 202	Materials and Shop Techniques	2	4
MECH 110	Mechanics of Materials	2	2
PROS 203	Field Practice	4	6
		22	30

Semester II

Course Designation	Course Content	Cr. Units per Semester	Hrs. per Week
MED 200	Intermediate Anatomy	4	4
MED 201	Introductory Physiology	2	2
MED 202	Introductory Pathology	1	1
PSY 203	Rehabilitation	2	2
PROS 200	Orthotic and Prosthetic Techniques	5	9
PROS 202	Materials and Shop Techniques	2	4
MECH 110	Mechanics of Materials	2	2
PROS 203	Field Practice	4	6
		22	30

Electives

Course Designation	Course Content	Cr. Units per Semester	Hrs. per Week
PHYS 100	Physics Elective	2	2
EC 100	Economics Elective	2	2
CHEM 100	Chemistry Elective	2	2
EL 105	Electrical Fundamentals Elective	2	2

Third Year

Course Designation	Course Content	Cr. Units per Semester	Hrs. per Week
MED 300	Advanced Anatomy and Kinesiology	2	2
MED 301	Physiology	1	1
MED 302	Pathology	1	1
PROS 300	Advanced Orthotic and Prosthetic Techniques	4	6
PROS 301	Physical and Occupational Therapy	1	1
PROS 302	Research Project	4	6
PROS 303	Field Practice	8	12
EC 113	Business Organization	1	1
		22	30

Watchmaking/En11

Continuous development of horological and precision industries requires an ever increasing number of servicing technicians and craftsmen with exceptional skills. The programs in watchmaking are designed to provide training on two different levels:

1. Two Year College Program
Graduates of the two year college program are qualified for employment in jewellery stores as watch repairers or in precision industries as craftsmen. In the province of Ontario graduates of this program are excused two years of apprenticeship in watchmaking and further in-school training, but must sign an apprenticeship agreement with the employer for one additional year.

2. Three Year College Program
With an ever increasing number of electrical and electronic watches and clocks, it has been necessary to develop a program of study which will qualify students in this new field of horology. This program will also provide additional training in servicing complicated watches such as chronographs, complete phase calendar watches, and complicated clocks. The graduate of a three-year program will be permitted to write the Ontario Department of Labour examination for certification as a Watch Repairer.

For the past several years a shortage of competent watchmakers has been noted throughout Canada and United States, and the employment opportunities for graduates are excellent. Competent watchmakers are also in demand in precision industries. The watchmaking trade also offers many opportunities for those who are aiming at self employment. The department hopes to offer a precision instrumentation option after the completion of the first semester of the two year program. An apprenticeship program is being developed in addition to the two and three year programs.

Admission Requirements: Ontario Grade 10 or equivalent

First Year/Semester I

Course Designation	Course Content	Cr. Units per Semester	Hrs. per Week
WATCH 130	Theory of Watchmaking	6	6
WATCH 131	Watchmaking Skills	12	18
SBM 132	Small Business Management	2	2
ENG 132	Language and Business Correspondence	2	2
MET 130	Metallurgy I	2	2
		24	30

Semester II

Course Designation	Course Content	Cr. Units per Semester	Hrs. per Week
WATCH 132	Theory of Watchmaking	6	6
WATCH 133	Watchmaking Skills	12	18
SBM 132	Small Business Management	2	2
ENG 132	Language and Business Correspondence	2	2
MET 130	Metallurgy I	2	2
		24	30

Second Year/Semester I

Course Designation	Course Content	Cr. Units per Semester	Hrs. per Week
WATCH 230	Theory of Watchmaking	6	6
WATCH 231	Watchmaking Skills	12	18
SBM 232	Small Business Management	2	2
ENG 232	Technical Writing and Oral Communication	2	2
MET 131	Metallurgy II	2	2
		24	30

Semester II

Course Designation	Course Content	Cr. Units per Semester	Hrs. per Week
WATCH 232	Theory of Watchmaking	6	6
WATCH 233	Watchmaking Skills	12	18
SBM 232	Small Business Management	2	2
ENG 232	Technical Writing and Oral Communication	2	2
MET 131	Metallurgy II	2	2
		24	30

Third Year/Semester I

Course Designation	Course Content	Cr. Units per Semester	Hrs. per Week
WATCH 330	Theory of Watchmaking	5	5
WATCH 331	Watchmaking Skills	12	17
INST 131	Electronic Instrumentation	4	4
SBM 332	Economics	2	2
MATH 136	Mathematics	2	2
		25	30

Semester II

Course Designation	Course Content	Cr. Units per Semester	Hrs. per Week
WATCH 332	Theory of Watchmaking	5	5
WATCH 333	Watchmaking Skills	12	17
INST 131	Electronic Instrumentation	4	4
SBM 332	Economics	2	2
MATH 136	Mathematics	2	2
		25	30

Business Equipment Servicing En41-OMRP605

This program is designed to provide the student with the theoretical and practical knowledge of various types of business machines; knowledge which is required of a business machine representative.

A business machine representative analyses and solves problems which occur on business equipment and assists customers to operate machines in a proper manner. The prospective representative should display a good mechanical aptitude, be neat and presentable, and be able to co-operate with other people. He should possess a current driving licence.

Because machines are increasing in number and in complexity, prospects in this occupation are excellent for the man who is ambitious and capable of working with a minimum of supervision.

Length of Program: 1 Year (40 Weeks)

Admission Requirements: Grade 12 (preferably) or Grade 10 and satisfactory completion of specified aptitude tests

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
BES 101	Figuring Machines	7	10
BES 102	Photocopying Machines	1	1
BES 100	Typewriters	6	9
EL 130	Electricity	2	2
PHYS 130	Physics	2	2
MATH 134	Mathematics	3	3
DR 132	Blueprint Reading	1	1
ENG 130	Language and Communication	2	2
		24	30

Instrumentation Mechanic/En42-OMRP628

Instrumentation mechanics are required wherever industries are located. These include chemical plants, power plants, steel plants, pulp and paper plants, pipelines, refineries and the instrument companies which make, sell and service the instruments. Instrument men may work as field service representatives, in the base plant on manufacture, repair or calibration, or in process plants on instrument maintenance. Students graduating from this course with honours standing will be considered for admission to the Instrumentation Technician program.

Length of Program: 1 Year (40 Weeks)

Admission Requirements: Grade 10

First Semester

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
INST 131	Electronic Instrumentation	11	17
INST 132	Installation Techniques	2	3
DR 137	Applied Drawing	1	2
MATH 132	Mathematics	3	3
ENG 130	Language and Communication	2	2
PHYS 132	Applied Physics	3	3
		22	30

Second Semester

INST 130	Pneumatic Instrumentation	11	18
INST 133	Analytical Instrumentation	3	4
MATH 132	Mathematics	3	3
ENG 130	Language and Communication	2	2
PHYS 132	Applied Physics	3	3
		22	30

Machine Shop Practice/En44-OMRP808

This course is designed to prepare students for entry into industry as machinists, apprentices, or machine operators. The category in which a student finds employment depends upon his age, previous experience, and the levels of skill and knowledge which he has acquired. Students find it advantageous to have completed Grade 12 in Machine Shop but, with suitable aptitudes and a willingness to work hard, those who have completed Grade 10 may prove successful in the course and later become good machinists.

Instruction is particularly concerned with measurement and machining to close tolerances, combined with production speeds and efficiencies of manufacture, sharpening cutting tools, and setting up machines.

Length of Program: 1 Year (40 Weeks)

Admission Requirements: Grade 10

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
MACH 140	Benchwork	1.5	2
MACH 141	Lathework	3.5	6
MACH 142	Milling and Shaping	2.5	4
MACH 143	Grinding	2	3
WELD 145	Welding	1	1
WELD 146	Welding		
DR 130	Blueprint Reading	2	4
MET 132	Metallurgy	2	2
MATH 136	Mathematics	4	4
PHYS 140	Physics	2	2
ENG 130	Language and Communication	2	2
		22.5	30

Plastics Theory and Techniques

Operator's Certificate is a one-semester program requiring grade 10 with drafting. Four programs are offered:

Set-Up Man, Thermoplastic (Machine Moulding)
Operator/Thermoplastic (Forming and Fabricating)
Operator/Thermoset (Hand Lay-Up)
Set-Up Man, Thermoset (Machine Moulding)

Plastics Theory and Techniques Set-up Man, Thermoplastic (Machine Moulding)/En45

Length of Program: 1 Semester

Course Designation	*Course Content*	*Cr. Units per Semester*	*Hrs. per Week*
PL 130	Thermoplastic Materials	4	4
PL 133	Thermoplastic Processes	10	14
PL 136	Thermoplastic Design	6	8
CHEM 135	Chemistry	1	1
PHYS 135	Physics	1	1
ENG 141	Language and Communication	1	1
MATH 133	Mathematics	1	1
		24	30

Plastics Theory and Techniques Operator/Thermoplastic (Forming and Fabricating)/En46

Length of Program: 1 Semester

PL 131	Thermoplastic Materials	4	4
PL 134	Thermoplastic Processes	10	14
PL 137	Thermoplastic Design	6	8
CHEM 135	Chemistry	1	1
PHYS 135	Physics	1	1
ENG 141	Language and Communication	1	1
MATH 133	Mathematics	1	1
		24	30

Plastics Theory and Techniques Operator/Thermoset (Hand Lay-up)/En47

Length of Program: 1 Semester

PL 132	Thermoset Materials	4	4
PL 135	Thermoset Processes	10	14
PL 138	Thermoset Design	6	8
CHEM 135	Chemistry	1	1
PHYS 135	Physics	1	1
ENG 141	Language and Communication	1	1
MATH 133	Mathematics	1	1
		24	30

Plastics Theory and Techniques Set-up Man/Thermoset (Machine Moulding)/En48

Length of Program: 1 Semester

PL 140	Thermoset Materials	4	4
PL 141	Thermoset Processes	10	14
PL 139	Thermoset Design	6	8
CHEM 135	Chemistry	1	1
PHYS 135	Physics	1	1
ENG 141	Language and Communication	1	1
MATH 133	Mathematics	1	1
		24	30

Welder Fitter/En51-OMRP815

Modern welding processes are continuing to revolutionize the metal fabricating industries and will effect even greater changes as new processes are developed. Welding is an integral part of a great many trades and remains the most economical method of joining metals. Graduates of this program are well prepared to advance beyond the operator level to positions of responsibility; welding supervision, welding inspection, sales and manufacturers' representatives, are but a few. Students graduating from this program will be considered for the Welding Specialist program, which is designed to prepare graduates to proceed toward positions in the welding industry at the technician level.

Length of Program: 1 Year (40 Weeks)

Admission Requirements: Grade 10

Course *Designation*	Course *Content*	*Cr. Units per Semester*	*Hrs. per Week*
WELD 140	Oxy-Acetylene Welding, Brazing and Cutting/Theory and Practice	2	3
WELD 141	Electric Arc Welding/Theory and Practice	6	10
WELD 142	Fabrication/Theory and Practice	3	5
WELD 143	Inert Gas Welding/Theory and Practice	1.5	2
WELD 144	Pipe Welding/Theory and Practice	1.5	2
DR 134	Plate and Structural Layout	1	2
DR 135	Blueprint Reading	1	2
MATH 136	Mathematics	2	2
ENG 130	Language and Communication	2	2
		20	30

Welding Operator/En52-OMRP816

This program provides an excellent opportunity for any man between 16 and 50 to learn a useful skill in a relatively short period of time and to enter a well paying trade at a mechanic's level. Because welding is an integral part of a great many trades, graduates of this course experience little difficulty in finding suitable employment. Evening courses in special welding techniques are readily available for the ambitious person wishing to prepare for advancement.

Length of Program: 1 Semester (20 Weeks)

Admission Requirements: Grade 8 minimum

The grade 10 prerequisite is waived for this program. Prospective candidates should have a minimum of grade 8 education, be ambitious, and be in good physical condition. Aptitude tests are available for applicants who need advice on their ability to succeed on the program.

Course *Designation*	Course *Content*	*Cr. Units per Semester*	*Hrs. per Week*
WELD 130	Oxy-Acetylene Welding, Brazing and Cutting/Theory and Practice	5	9
WELD 131	Electric Arc Welding/Theory and Practice	9	16
DR 147	Blueprint Reading	2	3
ENG 141	Language and Communication	2	2
		18	30

Welding Specialist/En53

With the continual introduction of many new types of sophisticated welding and cutting equipment, industry is becoming increasingly more complex and specialized. The man who is in constant demand by industry is one who possesses the theoretical knowledge and practical skills necessary to perform the specialized functions of welding many of the "exotic" space age metals, welding pressure vessels or piping to exacting code requirements, or fabricating complex structures from a variety of metals, working from complicated blueprints.

This program provides the opportunity for young men with a basic knowledge of welding to achieve much greater competency in the highly specialized fields of manual and semi-automatic inert gas welding, uphill and downhill welding of pipe, and metal fabrication.

This program is designed to provide the opportunity for young men to develop valuable skills, and, in addition, acquire the theoretical background necessary to prepare them to advance toward such industrial positions as process development, weld testing and inspection, quality control and design, at the technician level.

Length of Program: 1 Year

Admission Requirements: Prospective candidates should have successfully completed a Welding and Fabricating program at a College of Applied Arts and Technology or have specialized in welding at a Secondary School and possess a Grade 12 graduation diploma.

Course *Designation*	Course *Content*	*Cr. Units per Semester*	*Hrs. per Week*
WELD 100	Pipe Welding Processes	4	5
WELD 101	Tungsten Inert Gas Welding	1	2
WELD 102	Semi-Automatic and Automatic Welding Processes	2	3
WELD 103	Industrial Welding/Applications and Shop Procedures	4	5
MET 100	Metallurgy	2	2
MATH 100	Mathematics	4	4
ENG 100	Language and Communication	2	2
EL 100	Electrical Fundamentals	2	2
DR 118	Descriptive Geometry	1	2
DR 105	Technical Drawing	2	3
		24	30

Ironworker/En70

Length of Apprenticeship Term
Three periods of 2,000 hours.

Length of In-School Training Program
Basic Program: 8 Weeks
Intermediate Program: 7 Weeks
Advanced Program: 7 Weeks

Basic Program

Course *Designation*	Course *Content*	*Cr. Units per Session*	*Hrs. per Week*
IRON 10	Ironwork I	7	16
MATH 10	Mathematics	1.5	3
ENG 10	English	1	2
PHYS 11	Applied Physics	1	2
DR 14	Drafting	1.5	3
WELD 11	Welding	0.5	2
WELD 21	Welding	0.5	2
		13	30

Intermediate Program

IRON 20	Ironwork II	7	16
MATH 20	Mathematics	1.5	3
ENG 20	English	1	2
PHYS 21	Applied Physics	1	2
DR 20	Drafting	1.5	3
WELD 10	Welding	0.5	2
WELD 20	Welding	0.5	2
		13	30

Advanced Program

IRON 30	Ironwork III	7	16
MATH 30	Mathematics	1.5	3
ENG 30	English	1	2
PHYS 31	Applied Physics	1	2
DR 34	Drafting	1.5	3
WELD 41	Welding	1	4
		13	30

Machinist Apprentice/En71

Length of In-School Training Program
Basic Program: 8 Weeks
Intermediate Program: 7 Weeks
Advanced Program: 7 Weeks

Basic Program

Course *Designation*	Course *Content*	*Cr. Units per Session*	*Hrs. per Week*
MACH 10	Machine Shop	8	20
MATH 10	Mathematics	2	4
DR 14	Blueprint Reading	2	4
ENG 10	English	1	2
		13	30

Intermediate Program

Course *Designation*	Course *Content*	*Cr. Units per Session*	*Hrs. per Week*
MACH 20	Machine Shop	8	20
MATH 20	Mathematics	2	4
DR 24	Blueprint Reading	2	4
ENG 20	English	1	2
		13	30

Advanced Program

Course *Designation*	Course *Content*	*Cr. Units per Session*	*Hrs. per Week*
MACH 30	Machine Shop	8	20
MATH 30	Mathematics	2	4
DR 40	Blueprint Reading	2	4
ENG 30	English	1	2
		13	30

Millwright Apprentice/En72

Length of In-School Training Program
Basic Program: 8 Weeks
Intermediate Program: 7 Weeks
Advanced Program: 7 Weeks

Basic Program

Course *Designation*	Course *Content*	*Cr. Units per Session*	*Hrs. per Week*
MILL 10	Millwright I	7	17
MATH 10	Mathematics	1.5	3
ENG 10	English	1	2
PHYS 11	Physics	0.5	1
DR 14	Blueprint Reading	1.5	3
WELD 10	Welding	1.5	4
WELD 11	Welding		
		13	30

Intermediate Program

Course *Designation*	Course *Content*	*Cr. Units per Session*	*Hrs. per Week*
MILL 20	Millwright II	7	17
MATH 20	Mathematics	1.5	3
ENG 20	English	1	2
PHYS 21	Physics	0.5	1
DR 24	Blueprint Reading	1.5	3
WELD 20	Welding	1.5	4
WELD 21	Welding		
		13	30

Advanced Program

Course *Designation*	Course *Content*	*Cr. Units per Session*	*Hrs. per Week*
MILL 30	Millwright III	7	17
MATH 30	Mathematics	1.5	3
ENG 30	English	1	2
PHYS 31	Physics	0.5	1
DR 34	Blueprint Reading	1.5	3
WELD 30	Welding	1.5	4
WELD 31	Welding		
		13	30

Toolmaking Apprentice/En74

Length of In-School Training Program
Basic Program: 8 Weeks
Intermediate Program: 7 Weeks
Advanced Program: 7 Weeks

Basic Program

Course *Designation*	Course *Content*	*Cr. Units per Session*	*Hrs. per Week*
MACH 11	Toolmaking	8	20
MATH 10	Mathematics	2	4
DR 14	Blueprint Reading	2	4
ENG 10	English	1	2
		13	30

Intermediate Program

Course *Designation*	Course *Content*	*Cr. Units per Session*	*Hrs. per Week*
MACH 21	Toolmaking	8	20
MATH 20	Mathematics	2	4
DR 24	Blueprint Reading	2	4
ENG 20	English	1	2
		13	30

Advanced Program

Course *Designation*	Course *Content*	*Cr. Units per Session*	*Hrs. per Week*
MACH 31	Toolmaking	8	20
MATH 30	Mathematics	2	4
DR 41	Blueprint Reading	2	4
ENG 30	English	1	2
		13	30

Lathe Operator/En75-OMRP807

This course is designed to prepare students for entry into industry as Lathe Operators. Persons who have completed Grade 12 and have an interest in the Machine Tool industry will find this course most suitable as preparation for initial employment as a Toolroom or Production Lathe Hand.

Length of Program: 1 Session (12 Weeks)

Admission Requirements: Grade 10

Course Designation	Course Content	*Cr. Units per Session*	*Hrs. per Week*
MACH 137	Small Tools and Measurement	1	1
MACH 138	Lathe and Ancillary Equipment	5	21
DR 140	Blueprint Reading	1	4
MATH 133	Mathematics	2	4
		9	30

Food Technology

The George Brown College of Applied Arts and Technology

Food Technology
Graphic Arts

Food Technology
Program of Study

Food Processing Technology/F1

This program is designed to prepare the student for a career in any one of the many branches of the Food Processing Industry. Thorough schooling in the Applied and Biological Sciences and their application to the Processing of Food will be given. Concentrated instruction related to a specific branch of the Food Industry will be given in the final year. Prior to the commencement of the third and final year, the student will be required to select an area of concentration which will form the subject matter of his individual project.

This is a CO-OPERATIVE program in that the student will spend two semesters of four months each in academic training at the college, followed by a practical semester employed in the industry. Employment will be scheduled and arranged to test the level of academic skills developed as well as teach additional skills. Grades from practical phases will form part of the total grade. Students will be paid prevailing rates by industry during this practical phase.

Two entry dates for each calendar year; the first in September and the second alternating between May and January on alternate years.

Graduates can anticipate employment in the following:

1) Research and Development
2) Quality Control
3) Plant Sanitation
4) Production Supervision
5) Marketing
6) Technical Sales and Service
7) Government Inspection and Regulatory Services

Subject Concentration and Special Subject

In the third and final year, each student will be required to select a special aspect of the food industry, e.g. cereals, bakery, fats and oils, fermentation, government inspection, etc., for an in depth and concentrated study. Guidance will be provided from the instructional staff, however, all work, research, etc. will be done by the student. There will be no clearly defined instruction. A written thesis must be submitted reflecting the total results of the study.

Length of Program: 3 Years

Admission Requirements: Grade 12, *(of the 4 or 5 year stream) or acceptable equivalent, with a minimum standing of 60% in Science, (Physics, Chemistry, or Biology), Mathematics and English*

First Year/Semester I

Course Designation	Course Content	Cr. Units per Semester	Hrs. per Week
CHEM 102	General Chemistry	4.5	6
PHYS 103	Applied Physics	4.5	6
MATH 100	Mathematics	4	4
BIO 100	Biology	4.5	6
EC 100	Economics	3	3
FT 100	Food Industry	2	2
ENG 100	Language and Communication	3	3
		25.5	30

Semester II

CHEM 100	Chemistry	4.5	6
PHYS 103	Applied Physics	4.5	6
MATH 100	Mathematics	4	4
PHY 100	Physiology	4.5	6
EC 100	Economics	3	3
FT 100	Food Industry	2	2
ENG 100	Language and Communication	3	3
		25.5	30

Second Year/Semester I

CHEM 202	Organic Chemistry	4.5	6
FT 200	Food Engineering	5	6
FT 201	Food Processing	3	3
BIO 200	Biology	5	6
MATH 200	Mathematics	3	3
ENG 210	Communication	3	3
	Option	3	3
		26.5	30

Semester II

CHEM 202	Organic Chemistry	4.5	6
FT 200	Food Engineering	5	6
FT 201	Food Processing	3	3
BIO 200	Biology	5	6
MATH 200	Mathematics	3	3
ENG 212	Communication	3	3
	Option B	3	3
		26.5	30

Optional Subjects

MAR 204	Advertising and Sales Promotion
MAR 203	Introduction to Marketing
ACC 206	Accounting
ACC 202	Cost Accounting
EDP 203	Introduction to Automatic Data Processing
INST 131	Electronic Instrumentation

Third Year/Semester I

Course Designation	Course Content	Cr. Units per Semester	Hrs. per Week
CHEM 301	Biochemistry	4.5	6
CHEM 300	Chemistry	3	3
CHEM 302	Chemistry	6	9
SAN 300	Sanitation and Pollution	2	2
TF 300	Control and Evaluation of Food Quality	2	2
MATH 316	Elementary Statistics	2	2
FT 201	Food Processing	3	3
	Option	3	3
		25.5	30

Semester II

CHEM 301	Biochemistry	4.5	6
CHEM 300	Chemistry	3	3
CHEM 301	Chemistry	6	9
SAN 300	Sanitation and Pollution	2	2
TF 300	Control and Evaluation of Food Quality	2	2
MATH 316	Elementary Statistics	2	2
FT 201	Food Processing	3	3
	Option	3	3
		25.5	30

Optional Subjects

NUT 300	Applied Nutrition
INST 200	Automatic Control Principles I

Baking–Third Year Option

This course is designed to give students a broad, deep knowledge of the various techniques employed in the Canadian Baking Industry.

1. The physical and chemical aspects of the baking processes will be stressed as well as their application in production baking.

2. The courses as described in this program are available from the Extension Program with credits applicable to final certification. Thus, students employed in the baking industry can obtain certification through the Day Release Extension Program.

Prerequisite: Successful completion of the first year Food Processing Technology or an acceptable equivalent

Semester I

Course Designation	Course Content	Cr. Units per Semester	Hrs. per Week
BK 134	Bread making technology (Day: Tuesday)	6	6
BK 135	Cake making technology (Day: Wednesday)	6	6
BK 136	Cookie and Biscuit technology (Day: Thursday)	6	6
BK 137	Candy and Chocolate technology (Day: Friday)	6	6
BK 138	Decorating Techniques and Design (Day: Monday)	6	6
		30	30

Semester II

SAN 130	Sanitation, hygiene and microbiology techniques (Day: Monday)	6	6
TF 130	Quality Control and Product Development (Day: Tuesday)	6	6
BK 139	Bakery Engineering and Equipment (Day: Wednesday)	6	6
FT 130	Cereal Chemistry and Technology (Day: Thursday)	6	6
BK 140	Bakery Management (Day: Friday)	6	6
		30	30

Dietary Services Administration/F2

Successful graduates of this course will find a demand for their services in the Food Service Department at public and private institutions as assistants to Administrative and Therapeutic Dietitians or Food Service Managers.

Length of Program: 2 Years

Admission Requirements: Grade 12 *of the* 4 or 5 *year Streams with* a *minimum of* 60% *in Science*

First Year/Semester I

Course Designation	Course Content	Cr. Units per Semester	Hrs. per Week
HIND 100	General Orientation	1	1
FP 100	Food Preparation (Basic)	6	8
SAN 100	Sanitation and Hygiene	3	3
FT 100	Food Products and Standards	4	4
HIND 101	Menu Planning and Food Merchandising	5	5
MATH 110	Mathematics	3	3
ENG 110	Language and Communication	3	3
ACC 102	Bookkeeping and Accounting	3	3
		28	30

Semester II

Course Designation	Course Content	Cr. Units per Semester	Hrs. per Week
FP 100	Food Preparation (Basic)	6	8
HIND 102	Field Experience	3	6
HIND 103	Food Cost Analysis and Control	5	5
HIND 104	Human Relations	2	2
NUT 100	Nutrition and Diets	3	3
ACC 102	Bookkeeping and Accounting	3	3
ENG 111	Language and Communication	3	3
		26	30

Second Year/Semester I

NUT 200	Therapeutic Nutrition	3	3
HIND 201	Automatic Food Merchandising	3	3
FP 204	Food Preparation (Advanced)	6	8
FP 205	Cooking Demonstrations Techniques		
or			
HIND 200	Dining Room Service	4	6
EC 210	Economics I	3	3
EC 103	Business Law	2	2
ENG 210	Communication	3	3
BUS 201	Business Organization and Financing	2	2
		26	30

Semester II

TF 201	Food Science	3	4
FP 203	Introduction to Convenience Foods	3	3
FP 201	Testing and Development of Convenience Foods		
or			
BK 200	Quantity Baking and Dessert Preparation	(any two)	
or			
MC 200	Meat Cutting for Food Service Establishments	5	8
HIND 215	Types and Uses of Food Service Equipment	2	2
HIND 203	Design and Layout of Food Service Establishments	3	3
HIND 208	Payroll Analysis and Control	1	1
HIND 204	Personnel Management	3	3
HIND 206	Atmosphere and Interior Design	2	2
EC 211	Economics II	3	3
		25	29

Food Administration/F3

This course is designed to fill the growing need for men and women who are trained to administer food production on a large scale. Students are taught all aspects of food production from purchasing through to service and in addition are schooled in modern methods of management.

Successful graduates of this course may look forward to well paid positions in restaurants, institutions, and industrial catering companies at the mid-management levels.

Length of Program: 2 Years

Admission Requirements: Grade 12 or Journeyman Chef certificate with 2nd class honours

First Year/Semester I

Course *Designation*	Course *Content*	*Cr. Units* per *Semester*	*Hrs. per Week*
HIND 100	General Orientation	1	1
FP 100	Food Preparation (Basic)	6	8
SAN 100	Sanitation and Hygiene	3	3
FT 100	Food Products and Standards	4	4
HIND 101	Menu Planning and Food Merchandising	5	5
MATH 110	Mathematics	3	3
ENG 110	Language and Communication	3	3
ACC 102	Bookkeeping and Accounting	3	3
		28	30

Semester II

FP 100	Food Preparation (Basic)	6	8
HIND 102	Field Experience	3	6
HIND 103	Food Cost Analysis and Control	5	5
HIND 104	Human Relations	2	2
NUT 100	Nutrition and Diets	3	3
ACC 102	Bookkeeping and Accounting	3	3
ENG 111	Language and Communication	3	3
		26	30

Second Year/Semester I

FP 204	Food Preparation (Advanced)		
or			
FP 205	Cooking Demonstration Techniques	6	8
HIND 200	Dining Room Service	4	6
HIND 216	Theory of Catering	3	3
HIND 201	Automatic Food Merchandising	3	3
EC 210	Economics I	3	3
BUS 201	Business Organization and Financing	2	2
EC 103	Business Law	2	2
ENG 210	Communication	3	3
		26	30

Second Year/Semester II

Course *Designation*	Course *Content*	*Cr. Units* per *Semester*	*Hrs. per Week*
HIND 202	Classical Dining Room Service		
or			
BK 200	Quantity Baking and Dessert Preparation	(any two)	
or			
MC 200	Meat Cutting for Food Service Establishments	5	8
or			
FP 201	Testing and Development of Convenience Foods		
HIND 203	Design and Layout of Food Service Establishments	3	3
HIND 215	Types and Uses of Food Service Equipment	2	2
HIND 204	Personnel Management	3	3
HIND 205	Advertising and Promotion in the Hospitality Industry	2	2
HIND 206	Atmosphere and Interior Design	2	2
HIND 207	Innkeeping Law	1	1
FP 203	Introduction to Convenience Foods	3	3
EC 211	Economics II	3	3
HIND 208	Payroll Analysis and Control	1	1
HIND 209	Beverage Cost and Sales Control	1	1
		26	29

Hotel/Motel Administration/F4

The growing hotel and motel industry offers a variety of equally interesting career opportunities. Many, possibly the majority, of the jobs in the industry involve almost constant contact with the public, and require the sort of personality who can readily adapt to the often demanding situations which may arise. However, there are opportunities as well for the person with an analytical bend of mind.

The course delves into all aspects of hotel and motel management, and thus permits the student to become acquainted with the hotel and motel field as a whole, so that he can, upon graduation, decide in which particular area he wants to specialise. Graduates of the course will be able to find employment in the front office, sales, catering, beverage, accounting, personnel, and other departments of hotels and motels, as well as in related areas such as the institutional and restaurant catering field.

Length of Program: 2 Years

Admission Requirements: Grade 12

First Year/Semester I

Course *Designation*	Course *Content*	*Cr. Units* per *Semester*	*Hrs. per Week*
HIND 100	General Orientation	1	1
FP 100	Food Preparation (Basic)	6	8
SAN 100	Sanitation and Hygiene	3	3
TF 100	Food Products and Standards	4	4
HIND 101	Menu Planning and Food Merchandising	5	5
MATH 110	Mathematics	3	3
ENG 110	Language and Communication	3	3
ACC 102	Bookkeeping and Acounting	3	3
		28	30

Semester II

FP 100	Food Preparation (Basic)	6	8
HIND 102	Field Experience	3	6
HIND 103	Food Cost Analysis and Control	5	5
HIND 104	Human Relations	2	2
NUT 100	Nutrition and Diets	3	3
ACC 102	Bookkeeping and Acounting	3	3
ENG 111	Language and Communication	3	3
		26	30

Second Year/Semester I

HIND 210	Organization of Hotel Operations	3	3
HIND 211	Front Office Procedures	5	6
HIND 216	Theory of Catering	3	3
FP 206	Beverage Preparation and Service	2	2
HIND 200	Dining Room Service	4	6
BUS 201	Business Organization and Financing	2	2
EC 210	Economics I	3	3
EC 103	Business Law	2	2
ENG 210	Communication	3	3
		27	30

Second Year/Semester II

Course *Designation*	Course *Content*	*Cr. Units* per *Semester*	*Hrs. per Week*
HIND 212	Hotel Accounting	5	5
HIND 213	Hotel Law	1	1
HIND 204	Personnel Management	3	3
HIND 205	Advertising and Promotion in the Hospitality Industry	2	2
HIND 206	Atmosphere and Interior Design	2	2
HIND 208	Payroll Analysis and Control	1	1
HIND 209	Beverage Cost and Sales Control	1	1
HIND 214	Facilities Design and Layout	4	5
SAN 200	Housekeeping and Maintenance	3	3
FP 203	Introduction to Convenience Foods	3	3
EC 211	Economics II	3	3
		28	29

Chef Training (Pre-Employment)/F42

Graduates of this course will find unlimited opportunities for gainful employment in all areas of the Food Service Industry including Hotel Kitchens, Restaurants, Institutions, Commercial and Industrial Catering organizations.

Length of Program: 40 Weeks

Admission Requirements: Grade 10

Evening banquets are considered an essential part of this program. Candidates must be prepared to complete a minimum of 30 banquet hours during the program.

Semester I

Course *Designation*	Course *Content*	*Cr. Units* per *Semester*	*Hrs. per Week*
TF 131	Theory of Food	6	6
BK 130	Theory of Baking	1	1
MC 130	Theory of Meat	1	1
HIND 130	Kitchen Management	2	2
FP 130	Quantity Food Preparation, Practical	6	12
BK 132	Practical Baking	1.5	3
MC 132	Practical Meat Cutting	0.5	1
MATH 135	Business Mathematics	2	2
ENG 141	Language and Communication	1	1
NUT 131	Nutrition	1	1
SAN 132	Sanitation, Hygiene and Safety	1	1
		23	31

Semester II

Course Designation	Course Content	Cr. Units per Semester	Hrs. per Week
TF 131	Theory of Food	5	5
BK 130	Theory of Baking	1	1
HIND 130	Kitchen Management	4	4
FP 131	Advanced Quantity Foods	7	14
BK 133	Advanced Baking	1.5	3
MC 132	Practical Meat Cutting	0.5	1
MATH 135	Business Mathematics	1	1
ENG 141	Language and Communication	1	1
MC 130	Theory of Meat	1	1
		21	31

Cook Training (Pre-Apprenticeship) F43-OMRP614

This course is designed to prepare men and women for a career in professional cooking. Graduates are encouraged to enter the Apprentice Chef Training program and complete the requirements for the Provincial Certificate of Qualification as a Journeyman Chef.

Length of Program: 20 Weeks

Admission *Requirements: Grade 10* or *equivalent*

Semester I

Course Designation	Course Content	Cr. Units per Semester	Hrs. per Week
TF 131	Theory of Food	6	6
BK 131	Theory of Baking	1	1
MC 130	Theory of Meat	1	1
HIND 130	Kitchen Management	2	2
FP 130	Quantity Food Preparation Practical	6	12
BK 132	Practical Baking	1.5	3
MC 131	Practical Meat Cutting	0.5	1
MATH 135	Business Mathematics	2	2
ENG 141	Language and Communication	1	1
NUT 131	Nutrition	1	1
SAN 132	Sanitation, Hygiene and Safety	1	1
		23	31

Evening banquets are considered an essential part of the program. Candidates must be prepared to complete a minimum of 30 banquet hours during the program.

Retail Meat Cutting/Butchery/F44-OMRP642

Professional meat cutters are employed by the following organizations: independent meat stores, chain store meat departments, hotel and restaurant portion control supply houses, home freezer supply houses and catering organizations. Graduates of this course, because of their skill and immediate value to an employer, will experience little difficult in finding an employer of their choice.

Length of Program: 1 Semester (20 Weeks)

The first course will begin September, 1970 and the first Monday of each month thereafter. Prospective candidates for the semester are advised to contact the Registrar's Office for exact starting dates.

Admission *Requirements: Grade 10*

a) Ontario Department of Education Statement of Standing awarded after successful completion of Grade 10 of any four year program.
b) A combination of education and experience considered equivalent by the Registrar.
c) Prospective candidates must have a high standard of personal hygiene and be willing to take a complete medical examination which is administered by the Health Centre at the College.

Course Designation	Course Content	Cr. Units per Semester	Hrs. per Week
MC 133	Practical Meat Cutting	7.5	15
MC 134	Trade Theory	6	6
HIND 136	Business Procedure	2	2
SAN 131	Sanitation and Hygiene	2	2
NUT 130	Foods and Nutrition	2	2
MATH 135	Business Mathematics	2	2
ENG 141	Language and Communication	1	1
		22.5	30

Baking Apprentice/F45

This course is designed to give students a broad knowledge of the baking industry, giving them a knowledge and the skills to enable graduates to work in small bakeries, in-store bakeries, hotel and restaurant bakeries and pastry departments, hospital bakeries, and positions in plant bakeries.

The courses as described in this program are available from the Extension Program with credits applicable to final certification. Thus, students employed in the baking industry can obtain certification through the Day Release Extension Program.

Length of Apprenticeship Term:
Two periods of 2,000 hours each

Length of In-School Training Program:
Basic Course: 15 weeks, at the beginning of the Apprenticeship term
Advanced Course: 15 weeks conducted prior to the completion of the Apprenticeship term

Basic

Course Designation	Course Content	Cr. Units per Semester	Hrs. per Week
BK 15	Bread Craft (Basic)	4	6
BK 17	Cake Craft (Basic)	4	6
BK 18	Cookie Craft	2.5	4
BK 16	Pastry Craft (Basic)	4	6
BK 11	Related Theory	3	3
MATH 11	Mathematics	2	2
ENG 11	English	1	1
BK 10	Theory of Baking	2	2
		22.5	30

Advanced

Course Designation	Course Content	Cr. Units per Semester	Hrs. per Week
BK 25	Bread Craft (Advanced)	4	6
BK 26	Cake Craft (Advanced)	4	6
BK 27	Pastry Craft (Advanced)	4	6
BK 19	Decorating Craft	2.5	4
BK 21	Related Theory	3	3
MATH 21	Mathematics	2	2
ENG 21	English	1	1
BK 20	Theory of Baking	2	2
		22.5	30

Chef Training (Apprentice)/F46

Length of Apprenticeship:
Three periods of 2,000 hours

Length of In-School Training Program:
Basic Course: 15 weeks, conducted at beginning of the apprenticeship term.

Advanced Course: 15 weeks, conducted prior to the completion of the apprenticeship term.

Note: Evening banquets are considered an essential part of this course. All students will be expected to complete a minimum of 30 banquet hours per semester.

Basic

Course Designation	Course Content	Cr. Units per Semester	Hrs. per Week
TF 10	Theory of Food	6	6
BK 13	Theory of Baking	1	1
MC 10	Theory of Meat	1	1
HIND 10	Kitchen Management	2	2
FP 10	Quantity Food Preparation, Practical	6	12
MC 11	Practical Meat Cutting	0.5	1
BK 14	Practical Baking	1.5	3
MATH 11	Mathematics	2	2
ENG 11	English	1	1
NUT 11	Nutrition	1	1
SAN 11	Sanitation, Hygiene and Safety	1	1
		23	31

Advanced

Course Designation	Course Content	Cr. Units per Semester	Hrs. per Week
TF 20	Theory of Food	5	5
BK 23	Theory of Baking	1	1
HIND 20	Kitchen Management	4	4
FP 20	Advanced Quantity Foods	7	14
BK 24	Advanced Baking	1.5	3
MC 20	Meat Cutting	0.5	1
MATH 21	Mathematics	1	1
ENG 21	English	1	1
MC 21	Theory of Meat	1	1
		21	31

Retail Meat Cutting and Butchery (Apprentice)/F47

Length of Apprenticeship Term:
Two periods of 2,000 hours

Length of In-School Training Program:
One 15 week course at the beginning of the Apprenticeship Term

Course Designation		Course *Content*	*Cr. Units* per Semester	*Hrs. per Week*
MC	12	Practical Meat Cutting	7.5	15
MC	13	Trade Theory	6	6
HIND	11	Business Procedure	2	2
SAN	10	Sanitation and Hygiene	2	2
NUT	10	Foods and Nutrition	2	2
MATH	11	Mathematics	2	2
ENG	11	English	1	1
			22.5	30

Dining Room Service/F70-OMRP420

Graduates have ample opportunity to select positions from a variety of establishments in the Food Service Industry. Many hotel dining rooms, clubs, railway dining cars, and motels employ only trained personnel or graduates of recognized courses. Many graduates have entered the industry directly as junior managers with restaurant chains. Others find employment in institutions which permit advancement to the positions of captain, maitre d'hotel, assistant manager, manager, hostess or manageress.

Length of Program: 10 Weeks

Courses are started at one week intervals commencing in September each year. Prospective candidates are advised to contact the Registrar's Office for the exact starting date.

Admission Requirements: Grade 10 preference

a) The Grade 10 prerequisite is waived for this course. Prospective candidates should be well-motivated, have a pleasing personality and a good personal appearance.

b) Evening banquet service is considered an essential part of the practical training program. Candidates must be prepared to complete a minimum of 30 banquet hours during the program.

Semester I

Course Designation		*Course Content*	*Cr. Units per Session*	*Hrs. per Week*
HIND	132	Theory of Dining Room Service	2.5	5
HIND	133	Table Service	5	15
TF	133	Theory of Food	3	6
HIND	134	French Service	0.5	2
HIND	135	Beverage Service	0.5	2
			11.5	30

Graphic Arts

The George Brown College of Applied Arts and Technology

Graphic Arts
Programs of Study

Graphic Arts/G1

The Graphic Arts Industry plays an important role in the economy of the Province of Ontario and the City of Toronto in particular. It is experiencing continuous growth. Within the College environment, the instruction, equipment and facilities provided enable students to achieve up-to-date proficiency in all phases of operation. Those who enter the printing profession from these programs will be versatile enough to meet the challenge of technological change in the next decade.

The Graphic Arts Division of the College also offers shorter technical programs and refresher courses. In addition to the regular programs, some of these special courses will be developed for special segments of the industry, on either a full-time or a part-time basis, as particular needs are explored.

Length of Program: 3 Years

Admission Requirements: Grade 12, or equivalent

First Year/Semester I

Course Designation		Course Content	*Cr. Units per Semester*	*Hrs. per Week*
GR	100	Layout, Design, Typography	1.5	2
GR	101	Hot Metal Composition	2	3
GR	105	Photomechanical Reproduction and Film Imposition	3	4
GR	110	Printing Surface Preparation	1.5	2
GR	115	Machine Printing (Letter Press)	2	3
GR	116	Machine Printing (Offset)	3.5	5
GR	125	Binding and Finishing	2	3
PHYS	105	Physics	3	3
MATH	105	Mathematics	3	3
ENG	100	English	2	2
			23.5	30

Semester II

GR	100	Layout, Design, Typography	1.5	2
GR	101	Hot Metal Composition (Monotype)	2	3
GR	105	Photochemical Reproduction	3	4
GR	110	Printing Surface Preparation	1.5	2
GR	115	Machine Printing (Letter Press)	2	3
GR	116	Machine Printing (Offset)	3.5	5
GR	125	Binding and Finishing	2	3
CHEM	105	Chemistry	3	3
MATH	105	Mathematics	3	3
ENG	100	English	2	2
			23.5	30

Second Year/Semester I

Course Designation	Course Content	Cr. Units per Semester	Hrs. per Week
GR 200	Photo Composition (including Monotype and Friden Keyboarding	2	3
GR 205	Photochemical Reproduction and Film Imposition	2	3
GR 210	Printing Surface Preparation	1.5	2
GR 215	Machine Printing (Flexo)	3.5	5
GR 216	Machine Printing (Offset)	2.5	4
GR 225	Binding and Finishing	2.5	3
GR 220	Quality Control	1.5	2
ELTC 214	Electronics	2.5	3
MATH 205	Mathematics	3	3
ENG 200	English	2	2
		23	30

Semester II

Course Designation	Course Content	Cr. Units per Semester	Hrs. per Week
GR 200	Photo Composition	2	3
GR 205	Photochemical Reproduction	2	3
GR 210	Printing Surface Preparation (etching copper-plate using carbon tissue or Roto-film for Gravure) Step and Repeat	1.5	2
GR 220	Quality Control	1.5	2
GR 215	Machine Printing (Rotogravure)	3.5	5
GR 216	Machine Printing (2 color offset)	2.5	4
GR 225	Binding and Finishing	2.5	3
ELTC 214	Electronics	2.5	3
MATH 205	Mathematics	3	3
ENG 200	English	2	2
		23	30

Third Year/Technical Option

Specialisation in one of the following:

Type Composition (hot and cold)

Color Reproduction and Stripping Procedures

Machine Printing (Rotogravure, Flexo, two-color offset)

Binding and Finishing

Quality Control and Statistics

In addition, related studies in one or more of the following: Humanities (including studies of Trade Union Movement, Industrial Psychology, and Personnel Relations); Science, Electronics
Methods of study in the final year will encourage individual work, using various approaches, including writing a thesis.

Screen Printing/G40-OMRP633

Screen Printing is one of the fastest growing segments of graphic arts. In many cases it is more practical to Screen Print than to use a lithographic reproduction.

Mechanized Screen Printing has grown rapidly in the past decade due to the fact that the Screen Printing process is very versatile and the equipment is not as complex to operate as rotogravure, offset or letterpress. The introduction of fast drying ink formulations and the improved drying equipment, enables a small screen printer to realize ten times more profit for a short run compared with letterpress or offset.

Screen Printing offers excellent opportunities for employment in the field of printed circuits and printed advertising in the Province of Ontario. This industry is growing fairly rapidly and there is considerable demand for people who are versed in the various phases of this method of printing.

Length of Program: 1 Year

Admission Requirements:

a) Ontario Department of Education statement of standing awarded after successful completion of Grade 10 of any Four Year Program.

b) A combination of education and experience considered equivalent by the Registrar.

Course Designation	Course Content	Cr. Units per Semester	Hrs. per Week
SP 130	Screen Printing	14.5	23
MATH 134	Mathematics	3	3
ENG 130	Language and Communication	2	2
PHYS 139	Applied Science	2	2
		21.5	30

Offset Printing/G42-OMRP810

This short technical program is designed to prepare an Offset Pressman to operate various types of small Offset Printing Presses likely to be encountered in captive plants or small printing shops. Understanding the fundamentals of Typesetting, Line and Halftone Reproduction, Printing Surface Preparation, Binding and Finishing will enable the recipient of this course to obtain optimum results from the equipment available at the employer's print shop.

Length of Program: 40 Weeks

Admission *Requirements:* Grade 10 or *acceptable equivalent industrial experience*

Course Designation	Course Content	Cr. Units per Semester	Hrs. per Week
GR 130	Hand Composition, Ludlow, Repro-proof press	3	4
GR 134	Reproduction (Line and Halftone) and Film Imposition	1.5	2
GR 136	Printing SurfacePreparation	2	3
GR 138	Machine Printing (Letter-Press)	3	4
GR 140	Machine Printing (Offset)	7	9
GR 142	Binding and Finishing	1.5	2
GR 134	Mathematics	2	2
GR 130	English	2	2
GR 139	Physics and Chemistry	2	2
		24	30

Offset Printing/G70-OMRP844

This course is designed to meet the specific needs of the Graphic Arts Industry to retrain Letter-Press Journeymen for Offset Pressmanship and Offset Plate making. Although this program is short, it is very intensive and it provides adequate practical experience on a variety of single colour as well as two-colour Offset Presses. Fundamentals and the theoretical aspects of Offset Lithography and basic plate making procedures are included.

Length of Program: 10 Weeks

Admission *Requirements:* Sufficient experience as a Letter-Press Journeyman

Course Designation	Course Content	Cr. Units per Session	Hrs. per Week
GR 900	Machine Printing (Offset)	10	27
GR 905	Offset Lithography Fundamentals	1.5	3
		11.5	30

Varitype Operator/G71—OMRP648

This course has been designed to familiarize the student with the operation of the VariType Machine and its use and application in the Cold Type industry. Upon graduation students can anticipate employment in Cold Type Composition Houses, Advertising Agencies, Printing and Engineering firms, Insurance firms, Government offices, and Foreign Language Newspaper offices.

Length of Program: 16 Weeks

Admission *Requirements:* Grade 10 *or* equivalent and 40 wpm

Course Designation	Course Content	Hrs. per Week
ENG 141	Language and Communication	5
VAR 144	VariTyping	25
		30

Marine Technology

The George Brown College of Applied Arts and Technology

Special Techniques

Marine Technology

Details of Courses

Marine Technology Programs of Study

Marine Engineering Cadet/M1

This course is designed to prepare young men for careers at sea as engineer officers or for shore positions of a similar nature. The course is organized with the cooperation of shipyards, shipowners, equipment manufacturers, and the Federal Department of Transport. During the three years of training, each student will receive formal instruction in school from highly qualified marine engineers and will gain practical experience in dockyards or in machine shops of shipyards, engine manufacturing, or marine equipment manufacturing companies. The Engineer Cadet will receive a remuneration of approximately $250.00 per month while training at shipyards or machine shops. While working in shipyards or machine shops, students will continue to be under the jurisdiction of the school and will be required to complete written assignments.

Successful graduates may be employed as Junior Engineer Officers on ships of the companies who sponsor this program. Field trips are arranged during the school period to familiarize cadets with procedures in machine shops and ships.

At the end of the three year program students may write the examinations of the Federal Department of Transport for a Fourth Class combined certificate.

Graduates of the three year program will be eligible to receive exemption from Part "A" of the Federal Department of Transport examinations for Second Class and First Class certificates.

Three Year Program: (*Six* semesters *plus* 12 *months of supervised experience*

Admission Requirements: Grade 12

Semester I

Course *Designation*	Course *Content*	*Cr. Units per Semester*
EN 103	Applied Heat	1
EN 105	Applied Mechanics	1
EN 109	Metallurgy	2
DR 157	Drawing	2
EL 121	Electrotechnology	1
MACH 124	Machine Shop	2
MAR 111	Ship Construction	1
MATH 103	Mathematics	1
CHEM 121	Chemistry	1
ENG 103	English	1
		13

Semester II

Course *Designation*	Course *Content*	*Cr. Units per Semester*
EN 110	Metallurgy	1
EN 101	Engineering Practice	2
EN 104	Applied Heat	1
EN 106	Applied Mechanics	2
DR 114	Drafting	2
EL 122	Electrotechnology	1
MACH 125	Machine Shop	2
MATH 104	Mathematics	1
CHEM 122	Chemistry	1
		13

Semester III

Course Designation		Course Content	Cr. Units per Semester
EN	201	Engineering Practice	2
EN	203	Thermodynamics	2
EN	205	Applied Mechanics	1
EN	207	Strength of Materials	1
MAR	110	Ship's Business	1
DR	223	Drafting	1
EL	221	Electrotechnology	1
MACH	221	Machine Shop	2
MATH	203	Mathematics	1
			12

Semester IV

EN	202	Engineering Practice	2
EN	204	Thermodynamics	2
EN	206	Applied Mechanics	1
EN	210	Mechanics of Fluids	1
EN	208	Strength of Materials	1
DR	224	Drafting	1
EL	222	Electrotechnology	1
MACH	222	Machine Shop	2
MATH	204	Mathematics	1
			12

Semester V

EN	301	Engineering Practice	2
EN	303	Thermodynamics	2
EN	305	Theory of Machines	2
EN	311	Naval Architecture	1
EN	313	Strength of Materials	1
EN	307	Mechanics of Fluids	1
EL	321	Electrotechnology	1
WELD	10/11	Welding	1
WELD	20/21	Welding	1
MATH	303	Mathematics	1
			13

Semester VI

EN	302	Engineering Practice	2
EN	304	Thermodynamics	2
EN	309	Strength of Materials	1
EN	306	Theory of Machines	2
EN	308	Mechanics of Fluids	2
EN	312	Naval Architecture	1
EL	322	Electrotechnology	1
MATH	304	Mathematics	1
			12

Navigation Officer Cadet/M2

This course is organized with the advice and co-operation of Shipping Companies and the Federal Department of Transport to prepare young men for careers at sea as deck officers in the Canadian Merchant Marine. Students will receive formal instruction at the College from highly qualified mariners and will also gain practical experience on board ships of the merchant fleet during the three and a half years' training period. This period is divided into twenty-four months at school and eighteen months seagoing experience.

While undergoing their sea training cadets may expect to receive a nominal remuneration of approximately $250.00 per month and free board and lodgings while on shipboard. The shipping companies who sponsor this program will offer employment to successful candidates as junior navigating officers.

It should be noted that the Federal Department of Transport conducts examinations for, and issues Certificates of Competency in, the various deck officer grades. It will be possible for cadets to write the Second Mate Foreign-Going Certificate, and in addition, First Mate's Home Trade Certificate at the end of the three and a half years of training, provided that the sea service is approved.

Length of Program: 3½ Years

Admission Requirements: Grade 12
Period of Time at School: October 1–March 31
Period of Time at Sea: April 1–September 30

Note: All applications for this course must be accompanied by a Department of Transport Certificate attesting to a minimum vision of 20/20 and to normal colour perception.

First Year

Course Designation		Course Content	Cr. Units per Semester	Hrs. per Week
MAR	100	Ship Knowledge	6	6
MAR	101	Magnetism	1	2
MAR	102	Chart Projection	4	4
MATH	102	Mathematics	4	4
DR	117	Drafting	1	2
MAR	105	Meteorology	2	2
PHYS	102	Physics	4	4
ENG	101	English	1	2
EL	123	Electrotechnology	3	4
			26	30

Second Year

Course Designation		Course Content	Cr. Units per Semester	Hrs. per Week
MAR	200	Naval Architecture	4	4
CHEM	121	Chemistry	2	2
MAR	201	Seamanship	4	6
MAR	202	Ship's Business	1	2
MATH	202	Mathematics	4	4
MAR	203	Navigation	4	4
PHYS	201	Physics	4	4
EL	104	Electrical Fundamentals	3	4
			26	30

Third Year

Course Designation		Course Content	Cr. Units per Semester	Hrs. per Week
MAR	300	Naval Architecture	4	4
EL	204	Electrical Machines	3	4
MAR	301	Seamanship	4	4
MATH	302	Mathematics	4	4
MAR	308	Engineering Knowledge	1	2
MAR	303	Navigation	4	4
MAR	304	Meteorology	1	2
MAR	306	Magnetism	1	2
MAR	307	Chart Projection	4	4
			26	30

Fourth Year

MAR	404	Chart Projection	4	4
MAR	400	Naval Architecture	4	4
MAR	401	Seamanship	6	6
MATH	402	Mathematics	4	6
MAR	403	Navigation	5	6
EL	304	Electrotechnology	3	4
			26	30

Correspondence Courses/M(C)

The College offers correspondence courses dealing with the Department of Transport requirements for the various certificates of competency. Each course, which consists of 15 to 30 lessons, covers a subject area in a particular grade. They contain assignments which, upon completion, are to be sent to the College for marking.

Application forms for the courses may be obtained from the Registrar's office. The fee is $10.00 per subject and is payable by money order or cheque, to be made payable to George Brown College. Do not send cash.
The following is a list of the 31 courses available.

Marine Deck Officers

Second Mate Foreign-Going

FE1	Electronic and Other Aids to Navigation

Second Mate Home Trade

HN1	Navigation
HE1	Electronic and Other Aids to Navigation
HC1	Chartwork and Pilotage

First Mate Home Trade

HN2	Navigation
HS2(A)	Elementary Shipboard Knowledge (1)
HS2(B)	Elementary Shipboard Knowledge (2)
HE2	Electronic and Other Aids to Navigation
HC2	Chartwork and Pilotage

Second Mate Inland Waters

IC1	Chartwork and Pilotage
IE1	Electronic and Other Aids to Navigation

First Mate Inland Waters

IC2	Chartwork and Pilotage
IS2(A)	Elementary Shipboard Knowledge (1)
IS2(B)	Elementary Shipboard Knowledge (2)
IE2	Electronic and Other Aids to Navigation

Marine Engineering Officers

4th Class

4G	Engineering Knowledge General
4S	Engineering Knowledge Steam
4M	Engineering Knowledge Motor

3rd Class

3PM	Practical Mathematics
3G	Engineering Knowledge General
3M	Engineering Knowledge Motor
3S	Engineering Knowledge Steam

2nd Class

2MA	Mathematics
2AM	Applied Mechanics
2H	Heat and Heat Engines
2NA	Naval Architecture
4SE	Stationary Engineer 4th Class
3SE	Stationary Engineer 3rd Class
2G	Engineering Knowledge General

1st Class

1N	Heat and Heat Engines
1AM	Applied Mechanics

Marine Tutorial Courses/M(T)

Courses are offered which prepare qualified seamen for Department of Transport Certificates of Competency in all grades, as Marine Engineers or as Mates and Masters of ships in the inland and minor waters of Canada, home trade waters and foreign-going service.

The minimum age specified by Department of Transport regulations for holders of Certificates of Competency is 20 years. A qualifying period of sea service of 3 years is also required.

Opportunities for advancement are good in the Marine field as modern and larger vessels are built for the Merchant service. A Canadian Coastguard is also being formed, with new vessels for government service.

Special Marine Courses:

Marine Engineers/M40-OMRP631

Length of Course: 15 Weeks

Marine Engineering
Mathematics applicable to Engineering Problems, Boilers, Steam and Diesel Engines, Metals, Gases, Theory of Propulsion, Drafting, Combustion in Marine Engines, and Elementary Machine Shop Practice.

Marine Navigation Officers/M41-OMRP632

Length of Course: 15 Weeks

Navigation
Seamanship, Ship Stability and Construction, Magnetism and Magnetic Compass, Chartwork, Electronic aids to navigation: Radar, gyro-compass, echo sounder, direction finder and Decca Navigator equipment.

Radar Simulator
This is a realistic course in which navigation situations, involving up to five targets travelling on different courses at different speeds, can be made to appear on the radar screen. It is a practical course, wherein collision situations are set up and the student is given the opportunity of handling a vessel by simulation. Anti-collision exercises afford realistic training. This is a one week course.

Radar Observer
This course covers the principles of radar, adjustment of operational controls, practical starting and stopping equipment, interpretation of the display (including topography ashore as well as conspicuous objects afloat), factors affecting echo characteristics and false echoes, detection of movement plotting both relative and true, and working examples of plots containing fixed and moving targets with speed and course alterations. This course is combined with the Radar Simulator course. The duration is one month with three weeks devoted to Radar Observer or Theory and one week devoted to Radar Simulator or Practical.

A certificate of satisfactory attendance is given on completion of the Radar Simulator course. An endorsement is obtainable on examination by the Department of Transport after completion of the Radar Observer's course.

For more detailed information contact the registrar's office.

Special Techniques

The George Brown College
of Applied Arts and Technology

CONTINUING EDUCATION CONTINUING EDUCATION CONTINUING EDUCATION CONTINUING EDUCATION

Special Techniques

Details of Courses

Garment Pattern Making and Design
ST40-OMRP624

This course is designed to train graduates for entry into the following fields of employment: Garment Trade Industries; Boutique Shops; Stylist (fashion photography); Costume Designer.

Length of Program: 16 Weeks

Admission Requirements: Open

Course Designation		Course Content	*Hrs. per Week*
PAT	141	Pattern Drafting	16
PAT	142	Draping	2
PAT	143	Design	5
PAT	144	Grading	2
ENG	141	Language and Communication	5
			30

Dressmaking and Alterations/ST41-OMRP616

This is a practical course designed for those wishing to find employment in the following branches of the industry:

Custom Dressmaking
Finishing
Related fields
Alterations
Sales–textiles, boutiques, etc.

Length of Program: 20 Weeks

Admission Requirements: Grade 8 or equivalent

Course Designation		Course Content	*Hrs. per Week*
DRES	141	Dressmaking and Alterations	25
ENG	141	Language and Communication	5
			30

Power Sewing/ST42-OMRP639

This course is designed to provide the student with the basic sewing skills and techniques as used in the garment manufacturing industries.

Length of Program: 24 Weeks

Admission Requirements: Open

Course Designation	Course Content	Hrs. per Week
SEW 141	Industrial Power Sewing	25
ENG 141	Language and Communication	5
		30

Fur Business and Manufacturing Techniques ST43-OMRP1007

For the first time in Canada this program will give men and women an integrated course on fur; will develop in them skills in, and knowledge of the industry and its materials, techniques and products; will equip them for gainful employment by standardizing general and technical fur knowledge in such a way that they will be able to work profitably in any division in the fur industry and in some other trades where fur is used.

Length of Program: 40 Weeks (2 Semesters)

Admission Requirements: Grade 10 or test

First Year/Semester I

Course Designation	Course Content	Hrs. per Week
FUR 143	Fur Theory	14
FUR 144	Fur Manufacturing	9
ENG 132	Language and Communication	2
SBM 132	Small Business Management	5
		30

First Year/Semester II

Course Designation	Course Content	Hrs. per Week
FUR 145	Fur Fashion and Design	12
FUR 144	Fur Manufacturing	9
SBM 132	Small Business Management	5
FUR 147	Fur Marketing	2
ENG 132	Language and Communication	2
		30

Furniture Refinishing and Repair ST52-OMRP622

This course is designed to prepare the student for entry into the following branches of the furniture industry:

Furniture Repairing
Furniture Making
Furniture Refinishing
Furniture Finishing

Length of Program: 32 Weeks

Admission Requirements: Grade 8 or equivalent

Course Designation	Course Content	Hrs. per Week
FURN 152	Furniture Refinishing and Repair	25
MATH 134	Mathematics	5
		30

Furniture Upholstery and Repair ST53-OMRP623

This course is designed to develop enough skills to enable the graduate to find employment in any of the following branches of the upholstering industry: Custom Upholstering, Recovering, Production Upholstering, Springing.

Length of Program: 40 Weeks

Admission Requirements: Open

Course Designation	Course Content	Hrs. per Week
FURN 153	Furniture Upholstery and Repair	30

Barbering/ST70

This course has been designed to meet the requirements of the Ontario Government program for apprenticeship training. The aims are to provide instruction in the theory and practices as will be acceptable to the Barbering Trade.

Length of Program: 18 Weeks

Admission Requirements: Accepted as a registered apprentice in the Barbering Trade

Course Designation	Course Content	Cr. Units per Semester	Hrs. per Week
BAR 10	Barbering Theory	5	5
BAR 11	Barbering Practice	10.5	21
SBM 10	Small Business Management	2	2
ENG 11	English	2	2
		19.5	30

Hairdressing/ST71

Length of Apprenticeship Term:

Three periods of 1,500 hours each

Length of In-School Training Program:
Basic Program: 8 weeks
Conducted during first apprenticeship period.

Advanced Program: 8 weeks
Conducted during second or third apprenticeship period.

Admission requirement: Grade 9 credit

Basic Program

Course Designation	Course Content	Cr. Units per Session	Hrs. per Week
HAIR 10	Theory of Hairdressing	8	8
HAIR 11	Hairdressing Practice	10	19
ENG 17	Language and Communication	1.5	1.5
PHYS 17	Applied Science	1.5	1.5
		21	30

Advanced Program

Course Designation	Course Content	Cr. Units per Session	Hrs. per Week
HAIR 20	Theory of Hairdressing	8	8
HAIR 21	Hairdressing Practice	10	19
ENG 23	English	1.5	1.5
MATH 23	Mathematics	1.5	1.5
		21	30

Certified Building Custodian/ST73-OMRP611

With the continued growth of our towns and cities there is an ever increasing demand for trained custodial staff. This course is intended primarily for the student who is seeking job opportunities in the general field of building maintenance-cleaning.

Length of Program: 14 Weeks

Admission Requirements: Physically capable of carrying out work routines such as mopping floors and controlling floor machines; ability to follow instructions given in English

Course Designation	Course Content	Hrs. per Week
ENG 141	English	3
MATH 146	Mathematics	2
BCU 141	Custodial Theory	7
BCU 142	Custodial Practice	18
		30

Note: Successful students are rated at two levels:

a) Basic Building Custodian Level 1–this designation is given for proficiency in the Custodial Practical training only.

b) Certified Building Custodian Level 2–this designation is given to those students who demonstrate proficiency in both the Custodial Theory and the Custodial Practical training.

Commercial Vehicle Driving/ST74-OMRP802

The purpose of this course is to train students in the safe operation of a five ton standard commercial vehicle; and to prepare students for entry into the field of road transportation.

Length of Program: 3 Weeks

Admission Requirements: Grade 8 or equivalent. Must be in possession of a chauffeur's licence. Must be physically capable of handling a large vehicle and its load

Course Designation	Course Content	Hrs. per Week
COMM 10	Commercial Vehicle Operation	30

Tractor Trailer Driving/ST75-OMRP1004

The purpose of this course is to train students in the safe operation of a tractor trailer; and to prepare students for advancement in the field of road transportation.

Length of Program: 2 Weeks

Admission Requirements: Must have been employed as a driver of a standard commercial vehicle for not less than one year. Must be physically capable of handling a large vehicle and its load. Must be in possession of a chauffeur's licence. Must be able to pass a driving test on a standard commercial vehicle conducted by course instructors

Course Designation	Course Content	Hrs. per Week
COMM 11	Tractor Trailer Driving	30

Details of Courses

The George Brown College of Applied Arts and Technology

Details of Courses

ACCOUNTING

ACC 100/Introduction to Accounting
Fundamental principles of accounting. The entire bookkeeping cycle, including journals, posting, preparation of a trial balance, work sheet, adjusting and closing entries and preparation of a post-closing trial balance; sales and purchase journals and the cashbook are introduced with the use of subsidiary ledgers; financial statement presentation and interpretation will be discussed.

ACC 101/Accounting
The following topics will be covered. Partnerships, formation of limited companies, share capital transactions, returned earnings, dividends, reserves, bonds and sinking funds, investments, voucher systems, payroll accounting, departmental operations, manufacturing accounts.

ACC 102/Bookkeeping and Accounting
This course will deal with the following Bookkeeping and Accounting topics with special reference to their application to industry. The bookkeeping cycle including journals, posting, trial balance, work sheet, adjusting and closing entries, and post closing trial balance, purchase and sales journals, the cashbook and other subsidiary ledgers; financial statements with emphasis on interpretation.

ACC 154/Accounting
The following topics will be covered: general journal, cash journal, purchase and sales journal; general ledger, subsidiary ledgers and trial balance; work sheets; profit and loss statement and balance sheet; adjustments and closing entries; petty cash, drafts and promissory notes, bank reconciliations; classified financial statements, partnerships and limited companies, manufacturing accounts, bookkeeping for non-trading organizations, payroll accounting.

ACC 200/General Accounting I
A comprehensive study of the more complex accounting techniques. A detailed examination of the concepts, methods and systems involved in the measurement of net income and the determination of financial position will be discussed.

ACC 201/Accounting Systems
Designing general ledger account forms; automatic writing and reproducing equipment; account posting by machine methods; records management, systems and procedures, order and billing procedures, purchase orders and receiving procedures, accounts receivable and payable procedures, payroll and production control procedures, inventory procedures.

ACC 202/Costing Accounting I
Development of costing theory; product costing, process costing, planning, control, analysis; the use of cost accounting as a managerial tool.

ACC 203/General Accounting II
This course will relate accounting to management control and decision making. Analysis of financial statements will be stressed. Topics such as budgeting, profit planning and the importance of income tax will be discussed. Objectives of budgeting will be discussed and related to management.

ACC 204/Costing Accounting II
Control of operations and their costs through planning (both long and short range); variance analyses such as cost-profit-volume, break-even, gross profit and comparative costs.

ACC 205/Auditing and Taxation
Studies in internal control and basic audit methods and procedures including the audit of business transactions and the verification of assets, liabilities and equity items; the main emphasis will be on the use of internal audit as a tool of management for control purposes; sales and excise taxes—provincial and federal; income tax—personal and corporate.

ACC 207/Accounting
A special course in Accounting for students of the EDP program. Its purpose is to relate the principles of modern accounting practice to computerized data processing with applications for cost accounting, internal control, auditing and systems design.

AIR CONDITIONING TECHNICIAN

Course Outline

First Year

AIR 100/Refrigeration
Heat and temperature: Basic compression cycle. Basic system components, Refrigerants. Construction and Use of Pressure Enthalpy diagram. Refrigeration, Interrelationship of system components using P-H diagram. Flow controls. Types of Compressors. Types of Evaporators: including flooded and dry expansion liquid chillers, Baudelot cookers, surface type liquid coolers. Types of Condensers, cooling towers. Importance of head pressure control. System Operating Controls. System Safety Controls. Introduction to unitary equipment.

Practices in the laboratory in the use of hand tools, use of instruments: measurement of temperature, pressure, (calculation of superheat), ammeter, voltmeter, proper piping practice, joining methods, bending, soldering and methods of leak testing. Dismantling and examination of various compressors, flow controls, switches, construction of systems, applying various components discussed in the classroom, proper piping practice, proper testing procedures, and controls adjustment. Importance of cleanliness: use of strainers, filter driers, liquid and moisture indicators, as protection to flow controls, for hermeticmotor failure prevention, system cleanup after motor burnout. Use of high vacuum pump and electronic vacuum gauge.

AIR 105/Air Conditioning
Review of basic principles of physics pertaining to air conditioning. Air and human comfort, factors affecting comfort of human beings. Properties of air. Construction of psychrometric chart. Measurement of humidity. Use of psychrometric chart. Air conditions. Solar load analysis. Storage effect on building cooling load. Effects of external and internal shading devices. Basic heating and cooling load calculations. Principles of distribution system design for various types of residential application:
–ducted air systems
–electric systems.

Introduction to Ventilation, considerations for combustion air and occupancy, humidification. Air blower performance curves. Introduction to the use of the Equal Friction Chart. Introduction to the use of laboratory equipment. Use and care of testing devices—velometers, manometers, sling psychrometers, duct thermometers. Testing of centrifugal fans. Adjustment and balancing of distribution systems.

AIR 107/Hydronic Heating
Characteristics of heat, body comfort, and construction materials. Heat Loss calculations by I.B.R. "Detailed" and "Modern" methods. Types of hydronic systems and Component characteristics. Design of: Series Loop, One-Pipe and Two-Pipe reverse return systems for various types of residential structures.

Second Year

AIR 200/Refrigeration
Selection of cooling towers and related equipment. Unitary, Commercial, Industrial equipment. Heat Pumps. Refrigeration piping practice. Selection and application of the thermostatic expansion valve.
Continuation of Laboratory work of first year in system construction and analysis, testing, operating reports. Field trips to observe commercial practice. Trouble Shooting.

AIR 201/Automatic Controls
Control theory, terminology and measurements. Electric control circuits: Electronic control circuits and electronic control units. Pneumatic control units, controllers, actuators, control combinations. Commercial control systems: zone control, control of unit heaters and ventilators, control of commercial vented fan heating and cooling systems, control of peripheral air conditioning units, control of Radiant panel heating.

AIR 203/Air Conditioning Systems and Equipment
Heating and cooling load calculations. Air quantities for cooling requirements—affect of storage, zoning, and pendulum effect, water regain, equipment selection. Central Station—Filters, water, steam and cooling coils, Heating and cooling—Fans—Unitary equipment. Room coolers, Packaged Units. Water and air cooled Rooftop units. Split systems. Pump, ductwork design and layout —Air terminal equipment. High pressure dual duct and induction systems—Noise and vibration control. Out-line of control systems for Air Conditioning.

AIR 205/Estimating
Take-off of mechanical working drawings for duct work, piping layouts and machine room layout. Bill of materials and costing for air conditioning of commercial building and preparation of sales proposal.

ANATOMY

ANAT 100/Anatomy and Physiology
To acquaint students with the fundamental terminology pertaining to both the Anatomy and Physiology of the human body.
Course content: Terminology related to cells, tissues, organs and the skeletal, muscular, nervous, vascular, respiratory, digestive, urinary, reproductive and endocrine systems; fluids and electrolytes.

ANAT 101/Medical Terminology
To acquaint the students with the fundamental terminology pertaining to both drug classification and action and the medical terminology associated with laboratory tests and various sections of the hospital.
Course content: Introduction to Pharmacology; Nomenclature and therapeutic action of common drugs. Suffixes, roots, prefixes, abbreviations and symbols. Emphasis placed on spelling.
Two semesters.

APPLIANCE SERVICING

AP 130/Laundry Equipment
Theory and operation of laundry equipment, assembly and disassembly of wringer washers, automatic washers, dryers, dish washers, water heaters and water softeners. Electrical circuitry and controls, gas code and controls, service analysis and customer relations.

AP 131/Kitchen Equipment
Theory and operation of kitchen equipment, assembly and disassembly of ranges, dishwashers and garbage disposal units, circuitry, fault finding, and repair procedures.

AP 132/Refrigeration
Fundamentals, compression system of refrigeration, refrigerants, liquid feed devices, evaporators, compressors, condensers, electric motor controls, defrosting methods, food preservation, air conditioning, humidity in refrigeration, heat load calculations, absorption system of refrigeration, use and care of refrigeration tools and equipment, making refrigeration joints, welding, evacuating, charging, leak testing. Dismantling and assembling refrigerators and air conditioners, hermetic compressors, adjustments, maintenance service analysis, repair of refrigerators, air conditioners, ice makers and deep freezers.

AP 133/Electrical Appliances
The nature of electricity, basic electrical quantities, Ohm's Law and its application, electrical circuits, magnetism and electromagnetism, simple electrical generators, electromagnetic generators, circuit elements, power and heating effects, electric motors, transformers and rectifiers, electrical measuring instruments, automation electrical devices and transistors. Electrical circuitry, electrical controls and fault finding. A variety of stoves, small heating and motor-driven appliances are dismantled and repaired.

ARCHITECTURE

ARCH 100/Materials and Methods
The manufacture and use of cement, steel, brick and clay tile, plywood and timber, lime and gypsum, glass, plastic laminates, cast iron, malleable iron, copper, insulations, roofing materials, concrete design and control of mix, building construction, terminology and techniques.

ARCH 200/Materials and Methods
Practical application of building materials as used in the architectural building trades by lecture and application: contents specification, BCI (Builders Construction Index), filing system.

ARCH 201/History of Architecture
A review of the historical background of architecture from primitive man to the contemporary, with emphasis on Egyptian, Byzantine, Greek, Roman, Gothic and the Renaissance. Field trips to Royal Ontario Museum and local architectural examples.

BAKERY

BK 10/Theory of Baking
Study of the common ingredients in use in the baking industry and the common methods and equipment in use in the smaller bakeries, for breadmaking, cake making, cookies, desserts, pastries and decorative work.

BK 11/Related Theory
Sanitation and hygiene practices, common food poisoning organisms, safety, nutrition in relation to baked goods, and an introduction to bakery management.

BK 13/Theory of Baking
The use and control of bakery equipment, the safety and sanitation requirements. Basic knowledge of the ingredients in common use including flour, leavening agents, sugar, fats, milk and eggs. A study of the basic production methods of cake batters, bread doughs, pie and cookie doughs and decorating media.

BK 14/Practical Baking
The development of bakery skills in the preparation and production of fruit pies, yeast and sweet doughs, quick breads, choux paste goods, fruit, cereal, gelatin and steamed dessert, white, yellow and chocolate cakes, puff and danish pastries, varieties of cookies, chiffon and cream pies.

BK 15/Bread Craft (Basic)
Muffins, rolls (hard and soft types), pan breads, bun doughs, yeast doughnuts will be produced. The program also includes the related theory of ingredients and equipment.

BK 16/Pastry Craft (Basic)
Pies and tarts, custards, puddings, puff paste, choux paste, French pastries, doughnuts, pound and sponge cakes, with the related theory.

BK 17/Cake Craft (Basic)
Puff paste, choux paste, French pastries, cake type doughnuts, pound cakes, sponge cakes, and the use of fillings and coatings necessary to decorate and finish the varieties produced, with the related theory.

BK 18/Cookie Craft
The production of cut-out cookies, drop or piped cookies, ice-box cookies, bar and sheet cookies, types of finishing where applicable, with related theory of the ingredients, methods and equipment.

BK 19/Decorating Craft
Icings, toppings, decorating with icings, marzipan, gum paste, special occasion cakes, related theory of ingredients, methods and equipment and design work.

BK 20/Theory of Baking
A further study of ingredients, methods and equipment in use in the baking industry, including continuous methods of production, for breadmaking, cakemaking, cookies and biscuits. A further study of decorating materials and methods.

BK 21/Related Theory
Regulations governing the production of baked goods, management practices, production scheduling, cost control, stores control, and the use of quality control.

BK 23/Theory of Baking
Bakery ingredients will be studied in greater depth to give a knowledge of their effects in different formula types, and production methods. Basic formula balance for cakes, bread, cookies and pie doughs including the calculation of yield.
The production of gateaux, torten and special occasion cakes and decorating techniques will also be covered.

BK 24/Advanced Baking
The complete production of bread and sweet bread varieties, meringues, cheese cakes, bavarian creams, mousses, and dessert sauces, a selection of gateaux and torten, cookies and petits fours. All items will be suitably decorated where applicable.

BK 25/Bread Craft (Advanced)
Variety rolls and breads, including French, Italian and Hearth style, Danish Pastries, the related theory of ingredients, methods and equipment will also be included.

BK 26/Cake Craft (Advanced)
Petits fours, meringues, fruit cakes, high-ratio cakes, angel and chiffon cakes, with the related theory of ingredients, methods and equipment.

BK 27/Pastry Craft (Advanced)
Petits fours, meringues, hot Hors d'Oeuvres, fruit cakes, high ratio cakes, angel cakes, chiffon cakes and other varieties of dessert. Related theory of ingredients, methods and equipment.

BK 130/Theory of Baking

Semester I
The use and control of bakery equipment. The safety and sanitation requirements. Bakery ingredients will be studied to give an understanding of their effects in different formula types and production methods, this will include flour, leavening agents, sugar, fats, milk and eggs. Production methods for cake batters, bread doughs, pie and cookie doughs, decorating media and application.

Semester II
A further study of ingredients, methods and equipment in use in the baking industry, including continuous methods of production, for breadmaking, cakemaking, cookies and biscuits. A further study of decorating materials and methods.

BK 131/Theory of Baking
The use and control of bakery equipment. The safety and sanitation requirements. Bakery ingredients will be studied to give an understanding of their effects in different formula types and production methods, this will include flour, leavening agents, sugar, fats, milk and eggs. Production methods for cake batters, bread doughs, pie and cookie doughs, decorating media and application.

BK 132/Practical Baking
The development of bakery skills in the preparation and production of fruit pies, yeast and sweet doughs, quick breads, choux paste goods, fruit, cereal, gelatin and steamed desserts, white, yellow and chocolate cakes, puff and danish pastries, all varieties of cookies, chiffon and cream pies, meringues, bavarian creams, ices, and decorating techniques where applicable.

BK 133/Advanced Baking
The development of bakery skills in the preparation and production of fruit pies, yeast and sweet doughs, quick breads, choux paste goods, fruit, cereal, gelatin and steamed desserts, white, yellow and chocolate cakes, puff and danish pastries, all varieties of cookies, chiffon and cream pies, meringues, bavarian creams, ices, and decorating techniques where applicable.

BK 134/Breadmaking Technology
The baking industry; science in baking; mathematics applied to costing; materials (composition, usage, types and availability, storage and purchasing, raw materials testing.) Basic equipment; Basic sanitation and hygiene; production methods; formula balance; scoring; flow-line equipment; new production techniques; refrigeration; basic microbiology; basic accounting; packaging; advertising; merchandising; acts and regulations relevant to the baking industry.

BK 135/Cake Making Technology
The baking industry; science in baking; mathematics applied to costing; materials composition, usage, types and availability, storage and purchasing, raw materials testing; Basic sanitation and hygiene; basic equipment; production methods; formula balance; scoring; flow-line equipment; new production techniqes; refrigeration; basic microbiology; basic accounting; packaging; advertising; merchandising; acts and regulations relevant to the baking industry.

BK 136/Cookie and Biscuit Technology
The baking industry; science in baking; mathematics applied to costing: Materials; basic sanitation and hygiene; basic equipment; production methods; formula balance; flow-line equipment; refrigeration; basic accounting; packaging; advertising; merchandising; acts–relevant to baking industry.

BK 137/Candy and Chocolate Technology
The candy and chocolate industry; science in the industry; mathematics applied to costing; materials; basic sanitation and hygiene, basic equipment; production methods; formula balance; flow-line equipment; refrigeration; basic accounting; packaging; advertising; merchandising; acts–relevant to the industry.

BK 138/Decorating Techniques and Design
Background and history; science in decorating; mathematics applied to costing; materials; basic sanitation and hygiene; basic equipment; production methods; flow-line equipment; refrigeration; basic accounting; packaging; merchandising; acts–relevant to industry; design and layout; lettering and basic heraldry.

BK 139/Bakery Engineering and Equipment
A study of all types of bakery equipment, faults and breakdowns, plant layout and preventative maintenance scheduling.

BK 140/Bakery Management
Covering aspects of management as they apply to the baking industry.

BARBERING

BAR 10/Theory
Sanitary science; use of germicides, use of antiseptics, personal hygiene, shop hygiene. Basic knowledge; manufacture, use of parts, proper manipulation of combs, clippers and shears, kinds, temper, sizes, safety factors of razors, manufacture, quality, proper use of hones and strops. Basic theory; cells, digestion, circulation, bones of the head, muscles, nervous system, skin, shedding, regrowth of hair, light therapy, hair, scalp and skin ailments, theory of massage.

BAR 11/Practical Knowledge
Haircutting: Shape of heads, texture of hair, styling. Shaving: Texture of skin, texture of whisker, preparation, stroking of razor. Facials: Application of creams, manipulations. Shampooing: Suitable solvent for different scalp conditions, scalp treatments, recognition of diseases, application of high frequency current. Shop Management: Regulations governing shop ownership, location, simple bookkeeping, equipment, supplies. Professional Ethics: Developing personality, tolerance, understanding and respect for competitors, maintaining harmony among shop personnel.

BIOLOGY

BIO 100/Biology
Review of general biological concepts; structures and function of living things; chemical and biological evolution; cellular organization; life activities; metabolism; nutrition; respiration; and energy utilization.
This is a one semester course.
Lecture = 3; Laboratory = 3 hours per week.

BIO 200/Biology
An introductory course in food microbiology with emphasis on bacteriological techniques. The use and care of the microscope. The isolation of bacteria for the purposes of differentiation and classification by morphological, cultural and biochemical methods. The relationship of habitat to the occurrence of microorganisms on foods, microbiological action in relation to food spoilage and food manufacture; physical, chemical and biological destruction; methods for microbiol examination of food; public health and sanitation bacteriology.
Lecture = 3; Laboratory = 3 hours per week.

BUSINESS AND COMMERCE

BC 100/Principles of Advertising
An orientation course looking at advertising from the marketing, communications and consumer viewpoints. Stress is placed on: What advertising is, the position of advertising in our society, the psychology behind advertising. Advertising as it exists in the framework of both marketing and communications. A comprehensive study of the various types of media.

BC 105/Marketing
Major marketing functions, research, sales planning, advertising and promotion, inquiries and orders servicing channels of distribution. Marketing Organisation.
One Semester

BC 110/Business Law
A summary of our laws of contract, employment, agency, sale of goods. Insurance, bailments, real estate, negotiable instruments, partnerships. Corporation: bankruptcy, trade marks, business crimes and tests. Patents.
One Semester

BC 200/Advertising
Principles of planning and management. Advertising research and planning: what, when, where, and how?
One Semester

BC 201/Advertising and Sales Promotion
Types of advertising, advertising media, standards. The 'Agency'. The advertising department, functions, co-ordination, sales promotion, methods of effecting selling. Organization of the advertising and sales-promotion departments. Case studies.
One Semester

BC 205/Marketing
A case study approach to the institutions and channels of marketing. Study of the marketing process, research and product promotion. Analysis of pricing and control.
One Semester

BUILDING CUSTODIAL

BCU 141/Custodial Theory
Classroom instruction in subjects such as use and care of custodial equipment; for surfaces; washroom cleaning and servicing; carpet daily care and shampooing; wall and window washing.

BCU 142/Custodial Practical
Practical training with use of appropriate equipment in such areas as dust control; mopping and scrubbing; spray buffing; shampooing; on the job training in actual job situations under supervision.

BOOKKEEPING

BOK 148/Bookkeeping and Business Machines
Reasons for keeping records; the balance sheet; calculating profit; purpose and form of accounts; the general journal; the work sheet; simple adjusting entries; drafts and promissory notes; petty cash and principles of cash control; payroll; synoptic journal; perpetual inventories; manufacturing accounting.

BOK 152/Bookkeeping
An introduction into the basic principles of double ledger bookkeeping. Topics to be covered: journals, banking procedures, petty cash, ledgers, financial statements, control accounts, and subsidiary ledgers, taxes.
Two Semesters

BOK 153/Bookkeeping
The following topics will be covered: sales records, invoices, handling and recording of cash transactions, banking, deposits, cheques, reconciliation; types of accounts, payroll and income tax.

BOK 156/Bookkeeping
A review of the main features of Basic Double Entry Bookkeeping and Accounting Theory.

BUSINESS MACHINES

BES 100/Typewriters
The various makes and models of typewriters available and their basic differences, the principle operation of each machine, corrections, major type, styles and pitches, assembling and adjusting of the keyboard and impression control, carriage, escapement, universal mechanism, ribbon drive, bichrome mechanism, tabulator mechanism, comparison between standard and electric machines, repeat and non-repeat power aims, carriage return mechanism, power driven feature keys.

BES 101/Figuring Machines
Introduction to the basic principles and construction of adding machines, how an adding machine adds, various operations performed on adding machines, operating methods, manual and power operated, advantages and disadvantages of each, types of machines, ten key and full keyboard, advantages and disadvantages of each, methods of printing, disassemble, study and assemble individual units, keyboard, printer, accumulator, accumulator rack, mainshaft drive, motor and power transmission, machine adjustments, trouble shooting, tape reading, customer relations.

BES 102/Photo-Copy Machines
Theory of photo copy machines, disassembling and assembling, checking, trouble shooting, repairing, adjusting and replacing parts, safety precautions, customer relations.

BM 148/Business Machines
Ten key adding machines; printing calculator; full keyboard listing machine; rotary calculator; key driven calculator; McBee accounting system.

BM 152/Business Machines
An introductory course in the use of adding and calculating machines for the calculation of basic business mathematical problems.

BM 157/Business Machines
Instruction and practice using ten key adding machines and printing calculators; all phases of addition, subtraction, multiplication and division as related to today's business applications will be stressed. Preparation and processing of masters and stencils and introduction to spirit duplicator, mimeograph, collator and Xerox dry copier.

BM 158/Business Machines
An introduction to the main types of office equipment including adding and calculating machines, keypunch and duplicating machines.

BM 173/Business Machines
Instruction and practice on adding machines, printing and rotary calculators, and accounting machines. Application of practical exercises. Preparation of stencils and masters for duplication on spirit, mimeograph, offset or Xerox equipment.

BUS 100/Business Organization
An introduction to business that will acquaint the student with fundamental concepts of Canadian business. It recognizes the need for a thorough knowledge of how business operates by all students regardless of their area of specialization. Topics will include management, finance, production, personnel, and industrial relations.

BUS 201/Business Organization and Financing
An introduction to business that will acquaint students with the fundamental concepts of the operation of modern Canadian business. It recognizes the need for a thorough knowledge of business organization by all students regardless of their area of specialization. Topics will include management, production, personnel, industrial relations, and finance.

CARPENTRY

CAR 10/Carpentry I
Tools and their maintenance, preparation of materials; timber, growth, structure, recognition, conversion, seasoning, grading, defects, application; joints, classification, layout and application; fastening, power and hand nails, screws, accessories; adhesives, types, composition, manufacture, preparation, application; abrasives, types, manufacture, hand, portable and machine sanding. Shop and bench procedures, lay-out rod or board, detailing, order for milling, assembly methods; doors, sizes, types, construction, hanging; jambs, types, dimensions, erection; general hardware and application; intersection of mouldings, sections, use of mitre box, application; framing square, description, principles, markings, application; arches, centres, power tools, applied shop projects, safety, practical geometry.

CAR 20/Carpentry II
General construction, wall plates, floor construction, wall framing, insulation, roof framing, exterior trim and finishes; window frames, frame and masonry, trim around frames; sash, stock sizes, types, construction, order and fitting; inside partition, wall and ceiling treatments, floor coverings, use of level, power tools; applied shop projects, safety, practical geometry.

CAR 30/Carpentry III
Building permits, by-laws, building codes, general survey and registration of lands, soil condition, site-layout. Residential and commercial, use of transit. Excavations, drainage. Concrete practices, footings and foundation, columns, beams, sills, floors, form work, and application. Stair building, power tools, applied projects, safety, practical geometry.

CHEMISTRY

CHEM 100/Chemistry
Semester I: Introduction of Chemistry. Physical and chemical changes. Kinetic theory, atomic theory, valences, compounds, formulae, equations, nomenclature; chemical reactions, the structure of the atom; the periodic table, chemical bonds and structure of molecules, solids, liquids, and solutions.

Semester II: Rates of reactions and chemical equilibrium. Fundamental laws of Chemistry, solubility equilibria. Acids and bases, neutralization, pH problems, oxidation and reduction. Elementary electrochemical and nuclear chemistry. Introductory organic chemistry. Associated laboratory experiments.

CHEM 102/General Chemistry
Semester I: Introduction to chemistry, physical and chemical changes, kinetic theory, atomic theory, valences, compounds, formulae, equations, nomenclature, chemical reactions, atomic structure, periodic table, chemical bonds, molecular structure, solids, liquids, solutions and mixtures.

Semester II: Rates of reactions, chemical equilibrium, fundamental laws of chemistry, solubility equilibrium, acids, and bases, neutralization, pH problems, oxidation and reduction, elementary electrochemical and nuclear chemistry.
Lectures = 3; Laboratory = 3 hours per week.

CHEM 107/Chemistry
Introduction to chemistry. Physical and chemical changes. Kinetic theory, atomic theory, valences, compounds, formulae, equations, nomenclature, chemical reactions, the structure of the atom; the periodic table, chemical bonds and structure of molecules; solids, liquids and solutions. Rate of reaction and chemical equilibrium, fundamental laws of chemistry, solubility equilibria. Acids and bases, neutralization, pH problems. Water hardness. Introductory organic chemistry.

CHEM 110/Chemistry
Semester I: Introduction to chemistry. Physical and chemical changes. Kinetic theory, atomic theory, valences, compounds, formulae, equations, nomenclature, chemical reactions, the structure of the atom; the periodic table, chemical bonds and the structure of molecules; solids, liquids and solutions. Rates of chemical reactions; equilibrium in chemical reactions, solubility equilibria; acids and bases; neutralization, pH problems, oxidation and reduction, galvanic corrosion, water hardness.

Semester II: Fundamental laws of chemistry. Introduction to organic chemistry; the structure of organic molecules; alkanes, alkynes, alcohols, carboxylic acids; acid halides and anhydrides, ethers, esters, aldehydes, ketones, amines, aromatic and aliphatic compounds, amino acids, proteins. Introduction to polymer chemistry. Associated laboratory experiments.

CHEM 111/Analytical Chemistry
Qualitative analysis. Determination and characterization of ions in solution. Quantitative analysis. Application of laws of stoichiometry to gravimetric and volumetric analysis. Solutions, indicators, concentration, normality, molarity, precipitation. Associated laboratory work. Instrumental analysis. Colorimetric analysis, analysis by refractive index spectrophotometry, turbidimetry, mass spectrometry, polarimetry, electroanalysis.

CHEM 112/Industrial Chemistry
The organization and operation of the chemical industry: structure of the industry; unit processes; flow diagrams; equipment; raw materials and materials of construction; selected process industries for the manufacture of resins, polymers and inorganic chemical products. Field trips to these industries.

CHEM 113/Organic Chemistry
Definitions, bond types, classification, structural formulae and nomenclature. Alkanes, alkenes, acetylene, alkyl halides, alcohols, ethers, aldehydes, ketones, acids, esters, optical activity, amines, aromatic hydrocarbons, aromatic nitro compounds, aromatic amines, sulphonic acids, phenols. Associated laboratory work.

CHEM 121/Chemistry
Introduction to chemistry. Physical and chemical changes; kinetic theory, atomic theory, valences, compounds, formulae, equations, nomenclature; chemical reactions, the structure of the atom; the periodic table; chemical bonds and the structure of molecules; solids, liquids, and solutions. Rate of reaction, and chemical equilibrium. Fundamental laws of chemistry. Associated laboratory experiments.

CHEM 122/Chemistry
Introduction and classification of matter, properties of gases, atomic theory, chemical formulae and equations, atomic and molecular structure, chemical terminology, periodic table, properties of liquids and solids, solutions, rate of reaction, chemical equilibrium, ionic theory and electrolysis. Acids, corrosion and protection of metals, calculations and problems. Safety in handling chemicals, flammable and combustible liquids, incompatibility of chemical compounds, oil fire protection, gas hazards, entry into closed spaces, respiratory protective equipment, safe handling and stowage practices.

CHEM 135/Chemistry
Introduction to chemistry. Physical and chemical changes. Kinetic theory; valences, compounds, formulae, equations, nomenclature. Chemical reactions, the structure of the atom, chemical bonds.

CHEM 202/Organic Chemistry
Semester I: Introduction to organic chemistry; methods, nomenclature, saturated and unsaturated hydrocarbons; aliphatic and aromatic compounds; alkyl and aryl halides; alcohols, phenols and ethers; organo-metallic compounds.

Semester II: The carbonyl group; aldehydes and ketones, aromatic substitution; carboxylic acids; derivatives of acids; aliphatic and aromatic amines and nitro compounds; diazonium compounds and simple dyes; optical isomerism; amino acids.
Lectures = 3; Laboratory = 3 hours per week.

CHEM 207/Chemistry
Semester I: The structure of organic molecules, alkanes, alkenes, alkynes, alcohols, carboxylic acids, acid halides and anhydrides, ethers, esters, aldehydes, ketones, amines, aromatic and aliphatic compounds, amino acids, proteins.

Semester II: Basic concepts. Molecular forces and chemical bonding, functionality, molecular weight and its distribution, configurations and conformations, morphology. Chemistry of synthetic resins; types of resins, rubber impression materials. Physical and mechanical properties of dental materials; denture base resins, degradation of polymers, gypsum products.

CHEM 210/Chemistry/Polymer
Semester I: Basic concepts of polymer science. Molecular forces and chemical bonding, functionality, molecular weight and its distribution, configurations and conformations, morphology, addition and condensation, polymerization, copolymerization. Methods for determining molecular weights of polymers. Polymerization techniques.

Semester II: Natural organic and inorganic polymers. Degradation of polymers. Properties of polymers. Rheological properties and processing of polymers. Instruments for measuring rheological properties. Newtonian and non-Newtonian fluids. Types of flow. Polymer solutions and dispersions. Solid and molten polymers. Application of polymers. Associated laboratory experiments.

CHEM 215/Chemistry
Introduction to the principles of chemistry including discussions of atoms, molecules, ions, atomic and molecular weight, chemical changes, acids and bases and chemical equilibrium. A study of the chemical composition of cements and concrete.

CHEM 300/Chemistry
This course will cover the basic composition, structure and properties of foods as well as the chemistry of changes occurring during processing and storage.

CHEM 301/Biochemistry
An "in vivo" and "in vitro" study of the cellular chemistry. The metabolism of the carbohydrates, lipids, and proteins as well as the role of the vitamins, minerals, and water. Energy transformations, both aerobic and anaerobic will be discussed. Qualitative and quantitative biochemical analysis.
Lecture = 3 hours, laboratory = 3 hours per week.

CHEM 302/Chemistry
This course will deal with the principles, methods and techniques of qualitative and quantitative, physical and chemical analysis of foods. Standard Official Methods will be taught employing modern analytical instrumentation.
Lecture = 3 hours, laboratory = 6 hours.

CHILD CARE

CHI 160/CHI 260/Field Practice
Every student undergoes continuous supervised practical training in an institutional setting. First-year students spend two days a week in their field placements. Second-year students are in their field placement three days each week. This practical experience is of central importance in preparing students for specialized work with emotionally disturbed and handicapped children. Regular supervision is given by senior staff members of the institution and by course instructors. Field practice affords the students opportunities to take part in the hour to hour care of children under the guidance of experienced staff, who interpret the behaviour and special treatment needs of the children.

CHI 161/Child Study I
The basis for understanding well children and those who are physically or emotionally disabled lies in a study of normal infant, child and adolescent growth and development. This course provides groundwork knowledge of developmental processes observed in the realms of intellectual, emotional and social maturation.

CHI 162/Health and First Aid
This course deals with promotion and maintenance of health and with prevention of disease in the individual and in the community. Human physiological processes are explored as they relate to child growth and development. Care of the unwell child is discussed, with practice in simple nursing procedures. A Standard Red Cross First Aid Course is taught, with certification after successful examination.

CHI 163/The Function of The Family
The course examines the family in Canada and cross-culturally. Special emphasis is placed on the background of the family that produces a disturbed child. The goal of the course is to understand the psychological and sociological dimensions of the family.

CHI 164/Caring for The Disturbed Child
Students are helped to arrive at a treatment philosophy. Established occasions in daily lives of disturbed children are closely examined through Bruno Bettelheim's work, "Love is not Enough," and through the written observations of the students.

CHI 165/CHI 265/Activities with Children
The course is designed to develop skills to be used when planning recreational programs for groups of children. A wide range of arts and craft media will be explored and suggestions given for their use. Each student will also be encouraged to acquire a repertoire of children's games. During the first year students will be required to participate in a swimming and water-safety program and it is necessary for all students to pass a Red Cross water safety test. At the end of the second year leadership roles and the structure and cohesion of groups are studied to give insight into the dynamics of groups.

CHI 166/Social Services
Students are introduced to the legal aspects of Child Care and protection and become familiar with provincial legislation. Theory is re-inforced by visits to agencies, institutions and hospitals in the vicinity representing health, welfare, education, and correctional services. In addition representatives from social agencies are invited to the College to talk with students and answer questions. Community services to families and children, foster home and group home care are examined in the light of contemporary needs and provision.

CHI 167/CHI 267/Psychiatric Seminar
Psychiatric Seminars are held weekly for First Year and Second Year students. These meetings provide an opportunity for students to discuss problematical situations which arise in their field work and in human relations.

CHI 260/see CHI 160

CHI 261/Child Study II
Using normal growth and development as a background, this class explores abnormal behaviour. The history of treatment for disturbed people is examined and various current treatment theories are studied. The varying degrees of emotional disturbance are closely examined.

CHI 263/The Individual in Society
Students are introduced to the sociological perspective of human behaviour in groups. Contemporary social problems are studied and related to the individual in today's technological society.

CHI 264/Therapy of Play
Characteristic forms and patterns of play throughout the years of childhood and adolescence are examined in the light of their meaning to children and to the world about them. Students are guided to observe and to understand the play of disturbed children and emphasis is laid on introducing constructive play into milieu therapy.

CHI 265/see CHI 165

CHI 266/Introductory Psychology
This course provides the theoretical framework for the study of behaviour and students become familiar with the methods of psychological research. The nature of motivation, perception and learning will be related to inherited and environmental factors. The uses of psychological testing and theories of personality development are integrated into the study of conflict and adjustment.

CHI 267/see CHI 167

CIVIL ENGINEERING

CIV 100/Construction Materials and Methods
Wood, masonry, asphalt, concrete, reinforced concrete, structural steel, plan interpretations of structural drawings, foundations, footings, framing plans, schedules, details, plan study of bridges, types, materials of construction abutments, earthwork quantities, mass diagrams and identification of soil types.

CIV 200/Structures
The study of above ground installations to determine their components and method of construction; an extension of first year methods and materials with particular emphasis on plan interpretation.

CIV 201/Concrete
Reinforced concrete, concrete beams, columns, lintels, floors, walls, engineering and placing drawings, reinforcing materials, accessories, detailing practices in steel, reinforced concrete and wood.

CIV 202/Municipal Services
The collection and distribution of the community water supply. The factors influencing water runoff and disposal and the manipulation of topography and quantities to determine pipe sizes and gradients and location of sanitary and storm sewers.

CIV 203/Transportation
Population and traffic analyses as they indicate the need for transportation facilities. The location, design, and construction of urban and rural roads, including soils, surveys, materials, pavements, right-of-way requirements and maintenance.

CIV 204/Codes and Specifications
A study of building by-laws, zoning regulations, planning procedures, engineering specifications, critical path, computer applications to above.

COATINGS

COAT 100/Basic Paint Technology
Lacquers and Wood Finishes: staining and toners, fillers, sealers and primers, topcoats and polishing.
Architectural Finishes: consumer and industrial uses. Solvent and water based systems. Properties of primer and topcoat systems. Basic formulation, flat, eggshell, semi-gloss and gloss finishes. Brush, roller and spray application, tinting systems, primers. Substrate preparation and effect on performance.
Industrial Finishes: substrate preparation, primer systems. Application methods and formulation of air dry, baking, hot spray, electrostatic, curtain coating and electrophoretic type finishes.
Structural Steel and Corrosion Resistant Finishes: corrosion theory of ferrous metals. Surface preparation. Primers and wash primers, sacrificial coatings, topcoat systems. Adhesion of primer to substrate and of intercoats.

COMMERCIAL VEHICLES

COMM 10/Commercial Vehicle Operation
Defensive driving; laws affecting the operation of commercial vehicles; accident procedure; freight handling; the transmission of power; fire prevention in vehicles; vehicle handling, trouble shooting–fuel and ignition; first aid to the injured.

COMM 11/Tractor Trailer Driving
Defence driving; laws affecting the operation of commercial vehicles; coupling and uncoupling! air brakes; vehicle handling.

CONSTRUCTION

CO 100/Building Construction
Site selection, excavation, soils and simple tests, dewatering well points, footings, grade beams, grillage foundations, piles, caissons, water-proofing, damp-proofing, concrete formwork design, construction equipment, power and hand tools, scaffolding, hoists, shores, sheeting, needling, underpinning, concrete placement, protection and finishing, field trips to study construction procedures, detailing construction elements, drawing interpretation, systems and types of construction.

CO 101/Quantity Surveying I
Use of quantities, scales, duodecimals, methods of measurement, Canadian method of measurement for building works, excavating and backfill, concrete, masonry, rough carpentry, painting, floor covering, acoustical work, plaster work, take-off and calculation of simple structures.

CO 102/Mechanical Installations I
Water, sewage disposal, store drainage, pipe sizing, traps, fall, piping materials, couplings, joints, water pressure, plumbing layout, fixtures, ventilation, sprinklers.

CO 103/Construction Materials
The manufacture and use of cement, steel, brick and clay tile, plywood, and timber, lime and gypsum, glass glazing and caulking, plastic laminates, cast iron, malleable iron, copper, insulations, roofing materials, concrete design and control of mix, practical application of quality control testing of concrete under laboratory conditions.

CO 104/Site Engineering
Use of level and transit, hand levels and their uses. Use and adjustment of instruments. Levelling procedures, chaining, measuring horizontal and vertical angles, setting out buildings, offsets, curves, contours, earthwork quantities.

CO 105/Principles of Concrete
A study of the overall cement and concrete manufacturing industry, historical background and uses of concrete and concrete products. A detailed study of cement and its properties, concrete mix design, carrying out of standard quality control testing procedures, and compilation of results. The use, application, and characteristics of soil cement.

CO 106/Concrete Construction Methods I
An introduction to concrete components used in buildings, municipal services, road and bridges. Formwork erection and elementary formwork design. Mixing, transporting, placing, finishing and curing of concrete. Hot and cold weather concreting practices.

CO 107/Blue Print Reading and Drafting
Fundamentals of drafting, use of instruments and techniques and procedures. Interpretation of concrete structural drawings, standards and conventions necessary for the complete and proper understanding of the graphical language of construction.

CO 200/Building Construction
Reinforced concrete, structural steel, laminated timber, stone, roofing and sheet metal, partitions, doors, windows, window wall, panelling, plaster and drywall, acoustics, insulation, construction equipment, construction organization; the architect, structural engineer, mechanical and electrical engineers, field trips to study construction procedures, drafting detailing construction elements outlined above.

CO 201/Quantity Surveying II
Canadian method of measurement, reinforced concrete, structural steel, advanced masonry and stone, carpentry and millwork, terrazzo and tile, analysis of prices, pricing, overhead and profit, discounts, analysis of sub-contract bids, organization of estimating department, take-off and pricing of several trades, elemental bills of quantities.

CO 202/Mechanical Installations II
Principles of heating and air conditioning, types, heat loss and gain, calculations for buildings, humidity, relative humidity, ductwork, dampers and diffusion, air pollution, electrical equipment, principles of lighting, types of fixtures and wiring, transformers, floodlighting, underfloor duct and distribution systems.

CO 203/Contracts and Specifications
Contracts, contract law, standard forms, sub-contracts, purchasing, penalties, arbitration, liens, decision of architects, engineer or owner, changes, extras and credits, sample contracts, purchase orders, change orders, specification, standard specification, tender documents, bid and performance bonds, CPM, PERT scheduling theories, methods and practical applications.

CO 204/Mechanical and Electrical Installations
HEATING and AIR CONDITIONING: Heat loss, heating-load-calculation, warm-air heating, duct design, humidification, control of heating systems, hot-water heating, piping layout for hot-water heating, steam-heating systems, panel heating, snow melting, combustion-air requirements for heaters.
AIR CONDITIONING: Sensible heat, heat gain, roof sprays, example of cooling calculation, basic cooling cycle, condensers and compressors for air-conditioning, air-handling units, filters, controls, pumps.

WATER SUPPLY and PURIFICATION: Water needs in commercial buildings, for industrial buildings, cleaning water, water for fire protection, public water supply, independent water sources, transmission of water, distribution, valves, meters, quality and treatment of water.

PLUMBING and SPRINKLER SYSTEMS: Plumbing systems, elements of plumbing, drainage, fixtures, gas piping, sprinkler systems.

WASTE-WATER DISPOSAL: Types of sewers, sewer-pipe materials, joints in sewer-pipe.

ELECTRIC POWER and LIGHTING: Wiring systems and installations, electrical equipment, principles of lighting, types of fixtures, transformers, floodlighting.

ELEVATORS and ESCALATORS.

CO 205/Concrete Structural Design
Theory and design of reinforced concrete structures and structural elements. Methods, placement and types of reinforcing materials.

CO 206/Concrete Construction Methods II
A further study of concrete construction methods in terms of specialized building components. Basic study of light-weight concrete, concrete masonry units and concrete pipe and piling. Regulations and building codes as they relate to concrete construction and inspection methods.

DENTAL TECHNOLOGY

DENT 100/Dental Lab I (basic)
Dentures complete: acrylic trays, master model, bite rims, articulation, setting teeth, repairs, relines, remakes. Denture partial (resin): trays, models, rims, etc. Denture partial (cast): acrylic trays, master model, bite rim, articulation, survey, design, duplicate to refractory model, fabricating plastic or wax forms to design, investing, heating, casting, finishing, polishing. Bridgework: handling impressions, dies, models, bite preparation for articulation, waxing dies for acrylic veneers, acrylic crowns, gold crowns, investing, heating, mould, casting, trimming, polishing, packing resin. Bridgework, Precision attachment: acrylic trays, dies transfer copings, assembling dies into copings, master model, adjusting bite for articulation, waxing abutments with preparation for boxing, fitting attachment in boxing and soldering, fitting and soldering completion of attachment work to partial castings. Ceramics: dies, master model, bite preparation for articulation, adapting platinum foil, building and fusing of porcelain. Metal ceramics: dies, master model bite preparation for articulation, casting gold crowns, fusing porcelain to crown. Orthodontics: master model, fitting clasps, labial and/or lingual arch, springs for movement of teeth, expansion screw. Science: a comprehensive study of physical and chemical properties of dental materials such as gypsum products, impression materials, resins, waxes, investments, metals and their alloys.

DENT 101/Dental Materials
Proper weighing, measuring and manipulating materials. Composition of dental materials. Metallurgy. Composition and properties of dental alloys such as gold, chrome and steel.

DENT 102/Dental Anatomy
Study of tooth forms, tooth growth, eruption and anatomy. Physiology and anatomy of the head. Drawing and wax carving of selected teeth.

DENT 103/Science of Dental Materials
Semester *I:* Structure of matter, physical properties of dental materials. Gypsum products: chemistry of setting, basic principles, technical considerations. Impression compound, eugenol impression pastes, hydrocolloid impression materials.

Semester *II:* Rubber impression materials, chemistry of the synthetic resins, metals: solidification and structure, wrought metal: deformation, strain hardening, recrystallization.

DENT 104/Basic Health Science
Pharmacology, Histology, Pathology and Bacteriology as applied to the field of Dentistry. General Anatomy.

DENT 105/Dental Laboratory
Methods of preparing and casting models in gypsum materials. Fabricating acrylic resin impression trays, baseplates, and wax rims. A knowledge of general laboratory procedures.

DENT 106/Dental Materials
The preparation of dental materials, the physical and chemical compositions of dental materials and their limitations. (Lectures and Laboratory).

DENT 107/Dental Assisting
Appointments and office records, dental charts and records, cleanliness of the dental surgery, sterilization procedures, patient communication, maintenance and care of dental equipment, chairside assistance, first aid procedures for hemorrhage, fainting, artificial respiration, respiratory failure, asphyxia, heart attack, convulsions, and foreign bodies in the eye, throat and windpipe.

DENT 108/Professional Development
Personal hygiene and health, nursing essentials, control of communicable diseases and etiquette.

DENT 109/Dental Radiology
Hazards and safety protection, principles and materials in x-ray work, patient positioning, film placement, exposure factors, processing techniques and mounting methods.

DENT 110/Oral Hygiene
Tooth and supporting tissue care, brushing techniques, cleansing materials and care of dentures.

DENT 111/Clinical Practice
Every student undergoes continuous supervised practical training in a clinical setting which allows the student to use knowledge gained in the college and become acquainted with the expectations of the dental profession in terms of later full-time employment.

DENT 200/Dental Lab II
Similar to DENT 100 but at an intermediate level.

DENT 203/Science of Dental Materials
Semester *I:* Constitution of alloys, solid state reaction heat treatment, tarnish and corrosion, dental casting gold alloys, inlay casting wax, gold inlay casting procedures.

Semester *II:* Dental procelain, dental gold alloy wires, gold alloy solders. Carbon steel, bobalt–chromium alloys for dental castings. Abrasion and polishing, wrought base metal alloys–soldering and welding.

DENT 300/Dental Lab III
Similar to DENT 100 but at an advanced level.

DRAFTING

DR 10/Drafting
Reproduction process, three view drawing, use of instruments, alphabet of lines, invisible edges, dimensioning, sections and material symbols, freehand sketching, introduction to isometric drawing.

DR 11/Descriptive Geometry
Orthographic projection, the use of reference lines, principal and auxiliary planes, projection of a point, projection of a principal, parallel, perpendicular, oblique, intersecting and skew lines. True length of oblique lines by auxiliary view method, revolution and triangulation. Point on a line, point view of a line, true distance from a point to a line, true distance between skew lines.

DR 12/Drafting and Blueprint Reading
Three view drawing, lettering, use of lines, dimensioning and layout, sections and material symbols, freehand sketching, electrical symbols and introduction to residential layouts and wiring.

DR 14/Drafting and Blueprint Reading
Conventional lines. Orthographic multiview projection. Sections and material symbols. Auxiliary views. Dimensioning. Freehand sketching.

DR 18/Drafting
Use of instruments, geometrical shapes and construction, lettering, orthographic projection, isometric drawing, freehand sketching.

DR 20/Drafting
Plan study of frame, masonry and concrete construction regarding materials, construction members, methods of dimensioning, sections, details, schedules, and architectural standard symbols.

DR 21/Descriptive Geometry
Bearing and slope of a line, piercing point, edge view and projection of oblique planes by auxiliary view and revolution, visualization of lines and planes. Development of surfaces by parallel, radial line and triangulation methods. Regular shapes both right and oblique, truncated shapes, curved surfaces both single and double, transition pieces, flat surfaces and intersection of solids.

DR 22/Blueprint and Drafting
Study of a specific set of blueprints and specifications for a commercial-type installation; preparation of riser diagrams, wiring layouts and sketches from the above set of plans, with references to the Canadian Electrical Code rules and regulations.

DR 24/Drafting and Blueprint Reading
Aligned, revolved and auxiliary sections. Threads and fasteners. Fits and tolerances. Surface finish. Basic welding symbols. Simple development. Freehand sketching.

DR 28/Drafting
Auxiliary views, sections assembly drawings, drill and drill systems, materials, introduction to working drawings, conventions and notes, piping symbols.

DR 30/Drafting
Preparation of simple floor plans for masonry construction, brick coursing for window and door openings, wall sections and details, sections and details for steel frame construction.

DR 31/Drafting
Drawing of frame wall section, stair layout from floor plans and material estimates, form work details.

DR 32/Blueprint Reading
Electrical graphical symbols, analysis of various types of electrical drawings used in both commercial and industrial projects, study of one or more sets of plans with emphasis on the electrical sections, estimating electrical materials and preparation of sketches from above plans.

DR 33/Drafting
Types of piping drawing, single line, double line, isometric, pipe fabrication, drawings, piping symbols, plan reading of steam and hot water systems, boiler room piping and diesel engine, pipe hangers.

DR 34/Drafting and Blueprint Reading
Specifications of materials, structural steel shapes, piping symbols and piping drawings, welding drawings, tolerances and surface finishes.

DR 35/Drafting
Room, door and window schedules, interior wall elevations, estimating wall and ceiling surface areas, estimating cost of decoration.

DR 36/Drafting
Representation of structural materials used in metal lathing, preparation of large scale details of various partitions, large scale details of various partitions, large scale details of column and beam furring, details of suspended ceilings, light troughs, reflected ceiling plans.

DR 37/Drafting
Piping symbols, isometric drawing of drains, venting and fixtures, isometric drawing of complete plumbing systems, layout of complete septic tank system.

DR 38/Drafting
Assembly drawings: interpretation of shop and industrial prints, isometric piping and ducting layouts, plan reading of construction of blueprints, architectural symbols, graphs, mechanical plans for air conditioning systems.

DR 39/Drafting
Determining sizes of round duct work by calculation and graphically drawing floor plans and laying out trunk and branch ducts, sizing and estimating materials required.

DR 40/Drafting and Blueprint Reading
Sub-assembly and assembly drawings. Cams and gears, casting. Production tooling. Freehand sketches and machine drafting.

DR 41/Drafting and Blueprint Reading
Tool drawing, die sets and parts. Positioning of screws and dowels. Bills of material. Scrap strip layout, shear force calculations. Standard parts and use of catalogues. Standard material sizes. Stripping force calculations. Bend development. Pressure pads, knock-outs, use and selection of springs.

DR 42/Descriptive Geometry
Welding drawings, elements of the welding symbol, single and double combination, types of welds and welded joints. Structural steel shapes and standard mill sizes. Vector geometry, the use of vectors. Space, funicular and force diagrams. Equilibrium, resultants, Bow's notation. Co-planar, concurrent forces, bending moment and shearing force diagrams. Non-coplanar, non-concurrent forces, forces and stresses in structural members. Applied vector geometry.

DR 100/Technical Drawing
Equipment, instruments and materials. Pencil technique, lettering, geometrical constructions. Orthographic projection. Pictorial drawing; oblique, isometric. Dimensioning; fractions, decimals, Ford Rule, dimensioning systems. Freehand drawing; orthographic, isometric, proportions, notes. Sectional views; full, half, offset. Section lining, conventions. Auxiliary views; primary and secondary. Fasteners; threads, threaded products, terminology, symbols, rivets, keys, welding, brazing. Pipe fittings and valves; types of fittings, piping drawings, symbols. Assembly drawing; sectional views, exploded assemblies, bills of material. Detail working drawings; surface finish, tolerances, manufacturing methods. Cams; motion, displacement diagrams, cam profiles. Gears; principle types, terminology, manufacturing. Developments; basic descriptive geometry, parallel and radial line developments. Electrical and electronic drawing; symbols, wiring diagrams, instrumentation symbology, block diagram, printed circuits.

DR 101/Machine Drawing and Design
Selection of principal views using third angle orthographic projection drawing system. Sectional and auxiliary views. Graphs and charts. Axonometric drawing systems and dimensioning. Conventional drawing practices. Drawing office standards. Dimensioning methods and systems. Preparation of detail working drawings involving tolerances, limits, machine fits and finishes. Machine details such as fasteners, keys, springs, taper pins, and their purposes, selection, and applications. Thread systems; terminology, representation, specifications, standards and applications. Materials of modern industry; ferrous metals, non-ferrous metals and plastics. SAE numbering system for steel, heat treatment of steels small tool operations. Technical sketching in the orthographic and the isometric systems. Drawing office systems and work routines; filing systems, change notes, design and layout procedures, printing of drawings, print distribution and records. Common devices and mechanisms such as springs, cams, gears, clamps. Permanent assembly of parts by welding, brazing and soldering. Types of welding. Canadian Welding Bureau symbols and recommended practices. Design of fabricated and welded parts; special design and production techniques for welded products.

DR 102/Architectural Drafting I
Review of lettering, dimensions, symbols, and conventions as applicable to architectural drafting. Construction methods and use of materials for masonry and frame construction, stairs, chimney and fireplaces, floor and roof construction, millwork, windows, doors and interior partitions. Interpretation of by-laws and use Building Construction Index. Preparation of working drawings of plans, sections, elevations and details of frame and masonry construction from preliminary drawings and design sketches. Elements of lathing, plastering and bricklaying and mechanical installations of plumbing, heating and electrical systems. Sketching and delineation of presentation drawings and construction of presentation scale models. Building code interpretations and application form an integral part.

DR 103/Electrical Design Drafting
Review of drafting procedures, electrical symbols and electrical drafting layouts for residential, commercial and industrial installations, single and three phase branch circuit wiring systems. Lighting layout, HEPC rules and regulations, wire calculations and grounding. Electronic symbols and layouts including working and schematic drawings.

DR 104/Pipe Drafting and Design
Introduction to pipe classification, jointing methods, and pipe fittings. Valves; types, function and design. Representation of pipes, fittings and valves by single and double line symbols. Drawing methods: orthographic, developed, oblique, isometric and diagrammatic. Pipe bending and shop fabrication methods. Piping detail drawing using various techniques, and unit arrangements of manifolds, bypasses, drains and instrumentation connections. Selection of materials and equipment from catalogues. Pipe supports and hangers. Expansion joints and simple flexibility problems. Pipe insulation.

DR 105/Technical Drawing
Review of drafting equipment and instruments, their use, selection and care. Review of geometrical constructions, and terminology. Orthographic projection, principal views, pencil techniques, alphabet of lines and basic dimensioning. Visualization problems involving missing lines and missing views. Principal views in alternate positions. Advanced detail working drawings. Sectional views; full, half, offset, removed, and revolved. Conventional practices and section lining symbols. Small tool operations, surface finish, tolerances, dimensioning problems, specifications and notes on drawings. The SAE numbering system for steels. Technical freehand sketchings. Welding drawings. Standard welding symbols as authorized by the Canadian Welding Society. Assembly drawings, bills of material and estimating. Manufacturing processes. Heat treatment of steels. Electrical and electronic symbols, circuit diagrams and schematic diagrams. Symbols for pipe fitting and valves. Piping standards and specifications. Piping drawings. Isometric drawing and freehand sketching. The study of industrial blueprints and specifications.

DR 106/Architectural Drafting I
Introduction to dimensioning, symbols and conventions as related to architectural drafting. Methods and materials for frame and masonry exterior wall construction, finish materials and application, fireplace and chimney construction, flashing and millwork. The interpretation of the National Building Code in conjunction with the preparation of working drawings of plans, sections, details and elevations. Introduction of rendered elevations and perspectives.

DR 107/Mechanical Installation Drafting I
Piping symbols, plumbing systems, drains and vents, pressure systems, septic tank systems and sewers; types of hot water heating systems, boilers and connections; oblique and isometric piping plans.

DR 108/Structural Drafting I
Structural steel: design of simple beams, simple connections, detailing practices. Reinforced concrete: framing plans, detailing beams, slabs, walls, bar schedules.

DR 109/Electrical Installation Drafting I
Electrical symbols, preliminary studies of residential, commercial and industrial layouts. Wiring systems for single- and three-phase layouts. Theory and calculations of lighting layouts and types of lighting fixtures.

DR 110/Building Construction
Reinforced concrete, structural steel, timber, mechanical installations, construction methods for various types of construction, interpretation of architectural working drawings, plans, sections, elevations and details.

DR 111/Mechanical Drafting
Mechanical drawing techniques including views, sectioning, conventions, standards and dimensioning. The properties of metals, processes, types of weld and welding symbols. Pipe drawings, riser diagrams, heating and plumbing systems.

DR 112/Architectural Drafting
Three view drawing, alphabet of lines, invisible edges, dimensioning, sections and material symbols, freehand sketching, isometric drawing, architectural symbols and conventions. Preliminary study of various types of construction, materials and structural members. Plan study of architectural drawings and details.

DR 113/Drafting
Neatness and accuracy, care of instruments; lines and angles, measurement and bisection; division of a line; construction and use of scales, the diagonal scale. Construction of plane figures, triangles, regular and irregular polygons; enlargement and reduction by ratio of sides. Properties of the circle and its tangents; the ellipse; the parabola. Solid geometry; orthographic projection of regular solids: cube, cylinder, triangular and hexagonal prisms and pyramids.

DR 114/Drafting
Section, surface development and auxiliary views of regular solids including the cone. Orthographic projection of simple brackets and component machinery parts. Isometric projection, free hand sketching of simple machine parts. Standard conventions.

DR 115/Structural Drafting
Interpretation and preparation of design drawings for structural steel and reinforced concrete structures. Detail drawings of steel beams, columns. Design of bolted and welded framed connections. Design drawing and bar lists for reinforced concrete foundations, beams, columns, floor slabs and walls.

DR 116/Drafting
Extensive plan interpretation of residential, commercial and industrial buildings. Piping symbols, pictorial piping drawings, plan study of mechanical installations, boiler and piping layouts, air duct layouts. Electrical symbols and study of electrical wiring plans.

DR 117/Drafting
Instruments and materials. Geometric construction. Orthographic multiview projection, auxiliary views and sections. Dimensioning, tolerances and fits. Freehand sketching: oblique, isometric and multiview projections. Drawings of ships' construction: cross-sections of vessels, types of decks, pillars and hatches. Cargo plans.

DR 118/Descriptive Geometry I
Orthographic projection, primary and secondary auxiliary views. Basic descriptive geometric principles, points, lines, planes, true lengths and true shapes found by auxiliary views and by revolution, skew lines, piercing point of a line and a plane. Development of surfaces by parallel line, radial line and triangulation methods. Pattern drawing for sheet metal and plate fabrication, seam allowances, bends, materials and production methods. Welding symbols, welding drawings, structural shapes and bills of material.

DR 120/Descriptive Geometry I
Theory of multiview projection, single and double auxiliary views, cartesian co-ordinate system of locating points in space, true length of oblique lines, principal lines, bearing and slope of a line, problems involving parallel lines, intersecting lines and skew lines, problems involving points and lines, plane surfaces, edge views, true shape by auxiliary view methods, a point in a plane, shortest distance problems, dihedral angles, locating a given figure in a plane, location of a circle on a plane by the edge view method.

DR 121/Descriptive Geometry
Orthographic projection, principal views, alternative positions, primary and secondary auxiliary views, isometric sketching, basic principles involving points, lines and planes, true shapes found by auxiliary view and revolution methods, strike and dip of a stratum, apparent dip, bore holes. Problems involving tunnels, sewers, slopes, ore veins and outcroppings, etc.

DR 122/Basic Electrical Drawing
Lettering, use of instruments, linework, orthographic projection, dimensioning, sections, architect scale, isometric projection, sketching. Electrical and electronic symbols, basic electrical circuit diagrams, transformers, relays, riser and block diagrams, residential wiring, illumination, and electric heating.

DR 123/Engineering Drawing and Design
Review of drafting procedures and equipment. Third angle orthographic projection, sectional and auxiliary views. Monographs and charts. Axonometric drawing. Dimensioning methods and systems. Free-hand sketches. Preparation of detail working drawing. Working drawings involving tolerances, limits, machine fits and surface finishes. Machine details. Thread systems, specifications and standards. Engineering materials—SAE. numbering system and heat treatment of steels, welding drawing and design. Belt and chain drives—practical drive problems and design applications. Gearing; bevel, spur and worm gears. Couplings, speed reducers, bearing seals, lubrication. Cams and linkages. Fluid power-circuit diagrams. Electrical drafting—power circuits and motor control diagrams—electronic drafting as applied to simple handling systems. Pipe fittings, valves and pipe drawings, isometric sketching. Materials handling flow line diagrams—layout drawings and bills of material. Drawing office routine, filing systems, design change notes, printing of drawings, print distribution and records. The student will be encouraged to make drawings and design modifications by studying materials handling equipment manufacturers' specifications.

DR 124/Drafting
The principles of engineering drawing, geometrical construction, orthographic, axonometric and oblique projection, dimensioning, sections and auxiliary views. Pictorial drawing; secondary auxiliary views; sections; representation of fasteners, notes and legends. Reading of architectural plans. Introduction to piping and duct layout for ventilation, heating and air conditioning systems. Sheet metal fittings, registers, grilles and diffusers. Use of American Standard symbols. Graphical representation of electrical wiring diagrams.

DR 125/Machine Drafting I
Orthographic and pictorial drawings. Symbols, sections and conventions, auxiliary views and mechanical devices. Working, welding and assembly drawings; cams and gears. Introduction to electro-mechanical drawings.

DR 130/Drafting and Blueprint Reading
Freehand sketching of simple and complex objects using multiview, isometric and oblique projections. Blueprint reading: study of methods of representation of objects including ortho-multiview, isometric and oblique projection, dimensions and tolerances, notes and specifications, surface finish, auxiliary views, sections, threads and fasteners, gears and cams, simple developments, detail and assembly drawings, methods of reproduction of drawings.

DR 131/Drafting and Blueprint Reading
Three view drawing, alphabet of lines, invisible edges, dimensioning, sections and material symbols, freehand sketching, isometric drawing, architectural symbols and conventions. Preliminary study of various types of construction, materials and structural members. Plan study of architectural drawings and details.

DR 132/Drafting and Blueprint Reading
Alphabet of lines. Orthographic multiview projection. Dimensions and notes, tolerances and fits. Sections and auxiliary views. Pictorial drawings. Freehand sketching. Mechanical drafting. Interpretation of electrical drawings.

DR 133/Electronic Drafting
Use of instruments, orthographic projection, lettering, dimensioning, sectioning, sketching and isometric drawing. Application of graphical symbols in point-to-point, highway, airline diagrams. Description of cableforms, wire harnesses and locking devices. Materials and finishes, chassis and panel design. Printed circuit design.

DR 134/Plate and Structural Layout
Drafting equipment; selection, use and care. Basic geometrical constructions and terminology. Review of orthographic projection. Primary and secondary auxiliary views. Dimensioning problems and methods. Parallel line and radial line developments. Basic descriptive geometry principles; true length of lines, true shape of planes, true angles, by auxiliary view method. Dihedral angles, revolutions and intersection of planes. Developments by triangulation. Structural shapes, symbols and specifications. Plate sizes and specifications. Layout and development of plate and structural projects of a practical nature. Bills of material and shop notes.

DR 135/Blueprint Reading
Drafting equipment and instruments, their care and use. Basic geometrical constructions, terminology, pencil techniques, lettering, drawing to scale. Orthographic projection, principal views, alphabet of lines, detail working drawings, dimensioning principles, visualization. Primary and secondary auxiliary views. Freehand technical sketching using the orthographic system. Small tool operations, notes, specifications, tolerances, manufacturing standards. Reading of industrial blueprints of detail parts, and of welded and fabricated parts. Sectional views; full, half, removed, revolved, and offset. Section lining symbols and conventions. Structural shapes, symbols and specifications. Bills of material. Reading of industrial sub-assembly and final assembly welding drawings. Isometric drawing of detail and assembly drawings. Isometric freehand technical sketches.

DR 136/Drafting
Drafting equipment, use of instruments, geometrical shapes and construction, orthographic projection, dimensioning, sections, auxiliary views, isometric drawing, piping drawing, flow diagrams, single line and double line layouts, isometric piping, fabrication drawings, construction drawings.

DR 137/Applied Drawing
Standard drafting equipment, use and care of instruments, terminology, basic geometric constructions. Third angle orthographic projections using the principal views. Drawings of mechanical parts, lettering, basic dimensioning principles. Freehand engineering sketches. Auxiliary views. Principal types of sectional views, conventions, and standards. Pictorial drawing using the oblique and isometric systems. Piping drawings and sketches. Piping symbols. Reading of blueprints, conventional practices, standard abbreviations, specifications, material lists. Electrical and electronic symbols. Schematic diagrams and instrumentation control systems.

DR 138/Blueprint Reading
Orthographic projection, principal views, alphabet of lines, dimensioning practices, notes, sections, section linings, techniques of sketching, lettering. Pictorial drawings–oblique, isometric and perspective. Small tool operations, castings, auxiliary views, tapers, surface finishing, revolved and removed sections, springs and threads, welding symbols, assembly drawings. Types of building construction, standard conventions and symbols. Scale drawings, elevations, wall sections, plot plans, framing plans, details and schedules. Structural steel, reinforcing concrete, mechanical installations, and electrical blueprint reading.

DR 140/Drafting and Blueprint Reading
Alphabet of lines. Orthographic multiview projection. Dimensions and notes, tolerances and fits. Screw threads and fasteners. Sections and auxiliary views, pictorial views. Freehand sketching and machine drafting.

DR 141/Drafting
Semester *I:* Lettering. Use of instruments. One view drawings. Orthographic projection. Three view drawings. Conventional line symbols. Graphic method of laying out views. Dimensioning methods. Scale drawing. Full sections and half sections. Screw threads. Thread symbols. Thread notes. Shop terms and processes (drilling, reaming, boring, counterboring, countersinking, knurling, chamfering, bosses, pads, spotfacing, webs, keyways, keyseats, rounds, fillets, bolt circles). Standard abbreviations. Meaning of C.S.A. and A.S.A.

Semester *II:* Sectional views (aligned, revolved, removed). Common screw thread fasteners (bolts, nuts, cap screws, studs, machine screws, set screws). Fasteners in section. Assembly drawings and parts list. Auxiliary views. Isometric drawings of rectangular, angular and cylindrical objects. Oblique drawings (cabinet and cavalier). Sheet metal drafting using straight, parallel and radial line methods.

DR 142/Drafting
Semester *I:* Introduction to structural drafting, standard shapes, frame layouts, welded truss, strength of materials. Introduction to electronic and electrical drafting, elementary diagrams, symbols, component board assemblies, printed circuits and residential wiring.

Semester *II:* Introduction to architectural drafting, frame construction, fireplace, chimney and stair construction. Residential working drawings consisting of plans, sections and elevations. Architectural blueprint reading. Introduction to jig and fixture drafting, drill jigs and milling fixtures.

DR 147/Blueprint Reading
Drafting equipment and instruments, their use and care. Basic geometrical constructions, pencil techniques, drawing to scale. Orthographic projection, principal views, alphabet of lines, working drawings. Single auxiliary views. Basic dimensioning principles. Technical freehand sketching using the orthographic system. Small tool operations, notes, and specifications. Study of welding details and industrial drawings. Commonly used welding symbols approved by the Canadian Welding Society. Structural shapes, specifications and symbols in common use. Print reading of industrial welded sub-assembly and final assembly drawings. Sectional views; full, half, revolved.

DR 151/Architectural Drawing
Basic architectural drawing practices, use of instruments, lettering, symbols, detail tracing, working drawings; structural drawings and details; survey drawings and maps; ink linework and lettering; Leroy, applique and template lettering.

DR 152/Mechanical Drawing
Orthographic drawing, dimensioning, machine detail and assembly drawings, welding symbols, pattern development and layout, single and double line piping drawings, isometric drawings.

DR 153/Schematic Drawing
Basic electrical and electronic drawing practices, template drawing, symbols and conventions, circuitry schematics, schematic diagrams; tape graphs, charts and tape drawings.

DR 154/Art and Presentation
Freehand sketching, presentation media, pictorial drawing and rendering, use of water colours and charcoals, tinting and shading, technical illustrations, model making.

DR 155/Drafting and Blueprint Reading
Basic drawing principles and procedures, freehand sketching. Electrical and electronic symbols, layout for incoming services, pictorial drawing, control schematics, wiring diagrams, and printed circuits. Introduction to related piping, detail and assembly drawings.

DR 157/Drawing
Instruments used in drawing, usage of drawing equipment, orthographic multi-view projection, visualization of oblique and isometric drawings, basic drawing and drafting fundamentals, geometric construction, practical application of basic drawing principles in producing simple member sketches.

DR 201/Drawing and Product Design
Detail working drawings of an advanced nature. Design layout drawings drawn from engineering information and specifications. Projects involving various types of bearings, cams and gearing. Use of manufacturers' catalogues, standard parts, and engineering reference books. Manufacturing tolerances, allowances, machine fits and dimensioning systems as related to product design and manufacturing methods. Application of machine components including linkages, toggles, levels, eccentrics. Design principles and applications of basic gauges such as snap, plug. General design principles of jigs and fixtures. Application of commonly used jigs such as drill, plate,etc., and application of machine fixtures. Basic principles and applications of structural drawing. Checking drawings SAE codes and official specifications.

DR 202/Architectural Drafting II
Review of first year work, working drawings of commercial, industrial and institutional buildings, details of foundations, masonry and curtain walls, structural steel, reinforced concrete and laminated wood details, schedules, custom details, mechanical equipment, sanitary services, electrical services, presentation.

DR 203/Electrical Drafting
Introduction and preparation of the main types of electrical drawings including one line, schematic and wiring diagrams used in commercial and industrial installation. Estimating electrical materials from plans. Preparation of electrical job specifications. Wire and cable calculations.

DR 204/Design and Layout of Piping Systems
Arrangement of piping systems for steam, water, gas oil, chemicals, using conventional layouts and interpretation of the relevant codes. Layout of equipment, pressure vessels and related piping in terms of efficient flow conditions, and clearance from structural features. Flexibility studies and arrangement of hangers, guides and anchors. Pipe sizing, and pressure drop calculations. Special applications of control valves. Study of common operations, feed heating, condensing, evaporation. Estimation of piping costs. Visit to industrial piping installations.

DR 205/Electronic Design Applications
Review of electronic drafting procedures, wiring and connections. Printed circuits, micro electronics and transistor circuits. Layout selection and positioning of components, wiring and harness layouts. Electronic testing and environmental effects electronic estimating.

DR 207/Kinematics (Graphical)
Techniques of mechanism analysis. Displacement (linear, angular): paths of points on rotating bodies, producing specific paths. Linkages: to produce a given path, basic four bar, crank and slider, quick return, reverse, slow motion. Graphic analysis of motion velocity and acceleration, gears and gear trains, cams.

DR 208/Electrical Installation Drafting II
Layout of switchboards, distribution systems, central systems, electric heating systems. Production of drawings for electrical installations for industrial and commercial buildings. Preliminary study of HEPC regulations.

DR 209/Structural Drafting II
Design and detail of girders, columns, built-up members, trusses, floor systems in steel. Reinforced concrete design and detail of girders, columns, T-beams, buttress and cantilever walls, ribbed slabs, stairs. Heavy timber construction design and detail, beams, columns, and trusses.

DR 210/Mechanical Installations Drafting II
Detailing and layout of steam systems, sprinkler systems, refrigeration, air conditioning and forced air duct systems in connection with residential, commercial and industrial buildings.

DR 211/Architectural Drafting II
Review of first year work, working drawings on commercial, industrial and institutional buildings, details of foundations, masonry and curtain walls, stairs, structural details, schedules, custom details.

DR 212/Plant Layout and Handling Systems
Review of drafting procedures. History of materials handling. Flow diagrams of various systems, use of symbols, relevant catalogue data and flow process charts. Conveying and elevating materials utilizing belt conveyors, apron conveyors, screw conveyors, bucket elevators, circular carries and flight conveyors. Bulk materials handling involving unloading, storage, feeding and reclaiming. Feeding of materials by vibrating feeders, screw feeders, mechanical vibrating feeders, reciprocating feeders, bar flight and rotary vane conveyors. Parts and packaging handling utilizing chain conveyors, pusher chain conveyors, slat conveyors, overhead conveyors, monorail conveyors, arm conveyors and suspended conveyors. Horizontal movement of materials–non-fixed paths using jack lifts, trailer trains, platform trucks, straddle carriers and fork lift trucks. Warehouse activities. Railroad and truck handling. Air cargo handling. Handling of heavy equipment involving hoists, jib cranes and overhead cranes. The student will be encouraged to design plant layouts using the listed types of conveyors. He will also design and draw complete single conveyor layouts e.g. the belt conveyor–selection of pulleys, lagging, hubs, motor horse power and motor size, belt tension, belt construction, pulley load ratings, take-up blocks and bearing blocks. A thorough understanding of engineering materials handling catalogues will be stressed.

DR 220/Descriptive Geometry II
Plane surfaces, intersection of a line and a plane, intersection of two planes, intersection of planes and polyhedrons, location of a line perpendicular to a plane, dihedral angle between two oblique planes, shades and shadows, visualization of lines and planes, revolution of points, lines and planes, intersection and development of surfaces, using parallel line development, radial line development, and triangulation, practical pattern development problems.

DR 221/Descriptive Geometry
The location of points and lines in a plane, the slope of a plane, problems involving skew lines, intersection of two planes, intersection of lines and planes, dihedral angles, intersection of surfaces–plane and curved, cutting planes, location of workings, intersection of views, faults, outcrops, profiles and sections, contours, cuts and fills along level roads and along a grade road, practical problems and drawing practice, revolution and counter-revolution methods of solving practical problems.

DR 222/Descriptive Geometry II
Principles and applications involving oblique surfaces. Lines and points in oblique planes. Location of plane figures in oblique planes. Intersections of lines and planes, oblique lines, oblique plane and polyhedron. Dihedral angles. The system of revolution for finding true length of oblique lines, true shape of oblique planes, dihedral angles. Use of counter-revolution. Development of surfaces and intersected polyhedrons by triangulation. Pattern and development drawings, bend allowances, seams, and methods of joining. Single curved surfaces. Development of transition pieces. Double curved surfaces. Contoured surfaces and practical applications such as ships' sheer drawings. Problems which pertain to a wide range of general machine and mechanical industries.

DR 223/Drafting
Loci, simple problems on Loci; slides crank mechanisms, points and lines in space. Interpretation of surfaces, curves of interpretation of regular solids with axes at right angles. Fastenings: bolts, nuts and studs, standard screw threads, keys, cotters, pins, rivets and riveted joints. Bearings: pedestal and foot-step, ball and roller, lubrication. Couplings: simple shaft couplings, universal couplings.

DR 224/Drafting
Engineering details: simple machine tools, steam and other engine details: pistons, piston and connecting rods, stuffing boxes, crossheads and slides, slide valves and cranks. Types of valves and components for fluid systems. Standard symbols.

DR 225/Materials and Processes
Study of piping and valve materials, with reference to A.S.T.M. specifications and codes. Welding types and methods. Welding symbols and design considerations. Processes used in food, drug and petro-chemical industries. Principles of energy systems, atomic, fossil-fuelled, and hydraulic pollution control systems. Visits to industrial plant and utilities.

DR 227/Electrical Design Applications
Layout of switchboards, distribution systems, low voltage signal systems and electrical heating systems. Calculations for illumination and heat loss. Meters, mechanical design of related electrical equipment and transmission towers. Electronic chassis layouts and printed circuits. Complete design drawings for electrical installations for residential, commercial and industrial projects. Economics and efficiency of design.

DR 228/Air Conditioning and Refrigeration
Ventilation and exhaust systems. Principles of refrigeration, psychometrics and load estimating, types of systems, equipment selection, package units, system design and control systems, warm air systems. Design of combination heating and cooling systems.

DR 229/Heating Systems
Types of systems, principles of operation, heat loss, calculations, design and layout of plans for hot water, steam and electric systems. Fuel supply.

DR 230/Plumbing Systems
Separate, combined and semi-combined systems of drainage design, sizing of drains, materials, connections, stacks, wastes and venting systems, pipe sizing, fixtures, water supplies to high buildings, flow in open channels.

DR 231/Machine Drafting II
Detail working and assembly drawings of a more advanced nature to include the use of standard parts, manufacturers' catalogues and reference books. Piping drawings–single and double line, schematics. Intersections and developments. S.A.E. codes. Bills of material and estimating. Checking drawings.

DR 232/Drafting
Systems of piping drawing including piping symbols with drawing and sketching in multiview, isometric and oblique, Hydronic Systems, one pipe Ring Main, two pipe equal flow and one pipe drop system, introduction of American Standard symbols used in flow diagrams. Duct layout showing graphical symbols for heating, ventilating, air conditioning, plumbing, piping, valves and fittings. Reading mechanical, architectural and structural plans. Furred and ceiling space, dimensions in determining the location of building services–importance of exact location of floor sleeves for service risers. Types and uses of commercial sheet metal fittings, grilles and diffusers.

DRESSMAKING

DRES 141/Dressmaking and Alterations
The following topics will be covered: personal appearance; current fashions; consumer education (merchandising); care of garments; textiles, patterns (commercial); layout and cutting; machines (domestic and power) and their uses; unit construction; fitting; alterations; hand finishing and sewing techniques.

ECONOMICS

EC 100/Economics
Semester I: Forms of economic and business organization, supply and demand, money and banking, personal finance, international trade, business cycle, investment, insurance, uses and sources of credit, taxation.

Semester II: Cost analysis, human relations, sales, government law regulations, social services, classified financial statements, basic bookkeeping practices, proven promotion methods, advertising.

EC 101/Business Organization
Major economic processes, primary industries, manufacturing, distribution and service industries. Ownership and structure of business enterprises. Forms of public ownership. Major functions of the business enterprise, product development, purchasing, industrial relations, manufacturing, marketing.
One Semester

EC 102/Engineering Law and Administration
Semester I: Legal positions of electrical designers and responsibilities of engineer and architects. Small office organization and procedures. Public relations and salesmanship.

Semester II: The labour code, strikes, walkouts, responsibilities of construction firm and labour unions. Professional ethics.

EC 103/Business Law
A summary of our laws of contract, employment, agency, sales of goods, insurance, bailments, real estate, negotiable instruments, partnerships, corporation, bankruptcy, trade marks, business crimes and torts.

EC 112/Business Organization
Forms of business ownership. Personnel. Labour unions and forms of agreements. Production planning and control. Organization of a plastics manufacturing plant.

EC 113/Business Organization
Maintenance of records, charts, files, cost accounting, receivable and payable. Inventory, stock, supplies, materials, receipts. Budget, expansion and growth.

EC 210/Economics I
Basic economics and industrial organizations: forms of economic organization and their strengths and weaknesses. Monetary theory–money, credit and banking, Canadian banking system. Forms of business organization and business financing.
One Semester

EC 211/Economics II
Supply and demand business cycles and compensatory counter-cyclical fiscal policy. Labour economics. Insurance. Civics, organization of federal, provincial and municipal government. The place of the food service industry in the economic structure of the nation.
One Semester

EC 212/Business Organization
Administrative and office services. Auto data processing. Short, medium and long term financing and functions and methods of marketing. Sales and sales promotion activities.

EC 213/Business Administration
Analysis of business organization in the area of marketing, finance and production. The policy group, the administrative group. Organization and co-ordination. Types of organization, managemental controls. Functions of management.
One Semester

EC 214/Business Management and Labour Relations
A study of selected principles of and problems in industrial relations with emphasis on supervision. The essentials of successful management, organization, inventory control, regulations and other phases of small business operation.

EC 300/Business Management
The Manager's function in the organization and operation of a business. Pitfalls to be avoided; problems of planning; providing the capital; organization of the business; purchasing the stock; record keeping; credit and collections; depreciation and profit; insurance, merchandising; advertising and sales; employment and personnel; business control; relations to the community. Both large and small businesses are considered, with emphasis on the latter.

EDUCATION

ED 160/Teaching Techniques
Theories of learning, individual differences, adult learning, subject analysis, lesson planning, curriculum development; lesson types, teaching aids; evaluation, practical work, theory; practice teaching; critical appraisals of teaching techniques. The course is arranged to provide each student with several opportunities for practice teaching and for developing an appreciation of effective techniques. Before attending classes students are advised to read J. R. Kidd, How Adults Learn, Associated Press.

ELECTRONIC DATA PROCESSING

EDP 100/Introduction to Automatic Data Processing
Topics include: applications of automatic data processing particularly in business; functions of various unit record machines; codes for data representation; components of computers; characteristics of various input and output devices; simple programming exercises using an illustrative hypothetical machine language.

Note: Satisfactory score on aptitude tests required for advancement in the EDP program.

EDP 101/Introduction to Computer Programming (Part A)
Simple programming exercises using both a hypothetical machine language and a time sharing language (Basic); Assembler language; the role of an assembler; simple programming exercises using the assembler language associated with the hypothetical machine language referred to in the above; application of acquired programming skills in solving more complex problems relevant to other subject areas.

EDP 102/Introduction to Computer Programming (Part B)
More complex problems with same languages as in Part A involving use of flowcharts and decision tables; introduction to COBOL; file definitions, procedure division, simple programming exercising; consideration effecting selection of I/O devices for specific files; capacity, speed and limitations of various I/O media; field trips to computer installations.

Note: Students in the EDP program will take A & B concurrently. Part A is intended to be available as an option for students not following the EDP program who desire more knowledge of the subject than is provided in EDP 100.

EDP 148/Data Processing
Introduction to punched card data processing; history of data processing; characteristics and advantages of punched cards; the Hollerith code; magnetic switching and operation of selectors; equipment commonly found in unit record installations; 024 card punch, 082 sorter, 085 collator, 514 reproducing punch, 402 accounting machines, 602 calculating punch; control panel wiring; card handling and machine operation; punched card data processing applications.

EDP 170/Keypunch
Individual instruction plus taped lessons prepared by I.B.M. in the operation of keypunch and verifier models 024, 026, 029, 056, and 059; instruction in keypunch and verifier theory; application of practical numerical and alphabetical exercises.

EDP 171/Basic Unit Records
Basics of functional wiring and operating principles starting with an I.B.M. card punch; machine operation and functional wiring principles; advanced work on 077, 604, 602-A and 407.

EDP 172/Advanced Unit Records
A review of Unit Record equipment and operation with practical jobs: types of computers, the units of a computer, flowcharting, programming, switching, address modification, concepts of buffering, programming languages, programming systems.

EDP 200/Programming for Business Applications
COBOL: problems in updating master files, generating acounting reports, etc., involving both sequential and random access. *RPG:* introduction and exercises.

ASSEMBLER: (for specific actual system) introduction and exercises; field trips; on-job training.

EDP 201/Introduction to Systems Analysis
File organization, analysis of proposed application re feasibility, organization of files, selection of programming languages, documentation, case problems involving development of computer applications from raw problem state; on-job training.

EDP 202/Programming—Case Problems
A series of case problems involving system development as well as program coding to be solved by applying the programming skills acquired in earlier semesters along with the concepts being introduced concurrently in Introduction to Systems Analysis.

ELECTRICAL TECHNOLOGY

EL 10/Electrical Construction I
How to use the Hydraulic Bender: Electron Theory; Ohm's Law; Circuit Theory; Communication Devices; Circuit testing; Power, Chemical Cells: Introduction to HEPC Regulations; Conductors; Wire Calculations: Services; Control of Lighting Circuits; Wiring Methods; Distribution Systems.

EL 11/Electrical Practice
Wiring methods including conduit work, armoured cable work, alu-sheath, pyro-tenex, surface raceway, non-metallic sheath cable, bulldog strip; Circuitry practice including series, parallel and series parallel circuits; Ohm's Law practice.

EL 20/Electrical Construction II
Magnetism: Electro-magnetism; Power (Introduction), Induction; Direct Current Generators; Direct Current Motors and Controls; AC Theory.

EL 21/Electrical Practice
Advanced wiring methods; Hydraulic bending; service; Circuitry practice including closed circuit alarms, open circuit alarms, apartment communications systems; Basic AC and DC equipment projects.

EL 30/Electrical Construction III
Alternating Current: theory, systems, equipment.

EL 31/Electrical Practice
Complex AC and DC equipment projects including DC generators; transformers both single and poly phase.

EL 40/Industrial Electronic Controls
Types of electronic tubes, amplifiers, tube circuitry and application, shop work, power supplies, principle of timers, welding timers, current control with gas tubes, thyraton contactors, ignition contactors, phase shifting, welder heat control, resistance welders, sequence weld timers, synchronous weld timers, shop work, photo-electric relays, heat controls, light dimming controls, principle of speed and voltage regulators, speed regulators for small DC motors, voltage control for DC and AC generators, singlephase and poly-phase power rectifiers, oscillators, inverters, induction heaters, dielectric heaters, high speed light relays, register control servomechanisms, solid state devices and controls.

EL 41/Electrical Practice
Practical applications of the various components and systems studied in the theory section.

EL 100/Electrical Fundamentals
Basic electrical concepts: electron theory, emf. Ohm's Law resistance of conductors. Characteristics of DC circuits, Kirchhoff's Laws, power units, efficiency, electromagnetism, the magnetic circuit. DC measuring instruments, electrical measurements and systems of units, electromagnetic induction, Faraday's and Lenz's Laws, principle of rotating machinery, capacitance, alternating current, sine wave, relationship between effective value, average value and maximum value of current and voltage, characteristics of AC circuits, current and voltage as vector quantities, application of the J operator, LCR circuits, power in AC circuits, power distribution systems.

EL 101/Electrical Measurements
Electrical standards; current galvanometers; DC PMMC meter movements; design of multirange voltmeters, ammeters, and ohmmeters; instrument errors and their elimination; resistance measurement; DC bridge circuits; ground-fault location; insulation testing; voltage measurement and potentiometers; magnetic-flux measurement; AC indicating and recording instruments; instrument transformers; AC bridge circuits.

EL 102/Direct-Current Machines
DC machine construction; field and armature windings. Induced emf and counter torque; commutation; armature reactions; compensating windings; interpoles; operation of shunt, series, and compound generators; losses and efficiency; voltage regulation; generator test procedures; special DC generators; parallel operation. Operation of shunt, series, and compound motors; losses and efficiency; speed regulation; speed control; motor test procedures; special DC motors; motor selection. Manual starters; magnetic starters: DC relays and contactors. Control circuits. Maintenance.

EL 103/Electrical Lab I
Experimental proofs for the fundamental concepts of electrical circuits. Operation of diodes and triodes; rectifiers and filter circuits; simple amplifiers. Standard tests on DC generators and motors; parallel operation of DC generators. Connection and operation of manual and magnetic motor starters; operation of special DC machines; braking systems for DC machines; motor reversing. DC control circuits. Calibration of DC and AC indicating instruments; design and calibration of DC voltmeters, ammeters, and ohmmeters; resistance measurement; potentiometer design and operation; measurement of self inductance and mutual inductance; magnetic-flux measurement; insulation testing; instrument transformers; oscilloscope calibration and operation; induction-disc instruments; recording instruments.

EL 104/Electrical Fundamentals
Basic atomic structure; properties of conductors and insulators. Ohm's Law; series, parallel, and complex circuits; power; network theorems. Reluctance, inductance, and magnetic circuits, transients. Capacitance. Alternating-current generation. Voltage, current, and power in AC circuits. Reactance; impedance; phasor diagrams. Series, parallel, and complex circuits. Power, power factor, and Power-factor improvement. Resonance. Construction and operation of vacuum tubes; rectifiers and filter circuits; simple amplifiers.

EL 105/Electrical Fundamentals
Simple Electron theory of electric current: simple circuit theory, energy and power, conductors and insulators. Variation of resistance with dimensions and temperature; sources of EMF, cells and batteries, simple generators (AC and DC). Basic theory of alternating current, simple motors (AC and DC), control of common types of motors, operation and applications of voltmeters, ammeters, wattmeters and galvanometers. Simple bridge circuits and their use. Simple theory and use of cathode ray oscilloscope.

EL 106/Electrical and Electronic Fundamentals
Nature of electricity, basic electrical units, series and parallel circuits, power magnetism, inductance, capacitance, reactance and impedance. Theory of alternating current, simple AC and DC motors, control of common types of motors. Semi-conductors, control devices, diode tubes, vacuum tube operation and characteristics, amplifiers, electronic meters, cathode ray tubes. Control and signal systems. Automatic recorders.

EL 110/Electrical Fundamentals
Nature of electricity; basic electrical units; simple series and parallel circuits, power, magnetism, inductance, capacitance, the nature of alternating current; reactance and impedance; series resonance circuits; measuring instruments; transformer principles.

EL 112/Electrical Laboratory
Practical experiments to confirm Ohm's Law; Development of measuring instruments; LR and RC time constants; Parallel and series resonant circuits. Vacuum tube and transistor circuits and component tests.

EL 120/Materials and Methods
The physical, electrical and chemical properties of organic and inorganic materials and their uses as conductors, insulators and structural members. Materials used in electrical design and methods used in manufacturing processes. Electrical estimating and specifications.

EL 121/Electrotechnology
Construction of matter. Electrical changes in basic motion, rates of flow, effects, magnetism, permanent and electro-magnetic, basic theory, ferro and non-magnetic materials, force and pole strength, current electricity, units, power, energy, series and parallel, instruments.
One Semester

EL 122/Electrotechnology
Electrolysis, Faraday's Laws, ECE, primary and secondary cells, BH curves, resistivity, conductance, Lenz's Laws, electrostatics, field, changes, capacitance.
One Semester

EL 123/Electrotechnology
Introduction to electricity, coulomb and the ampere, Ohm's Law, the series circuit, the parallel circuit, electric power, resistance measurements, the magnetic field, Ohm's Law for the magnetic circuit, sine wave analysis, the voltmeter and the alternator, induction.

EL 130/Electrical Fundamentals
Electron theory, sources of electricity, basic electrical quantities, Ohm's Law and its application, series and parallel circuits, symbols and schematic diagrams, magnetism, electromagnetism, wiring practice, common electrical hazards, motors, transformers, relays, test equipment, service analysis, vacuum tubes, transistors.

EL 133/Electrical Theory
The nature of electricity, basic electrical quantities, Ohm's Law and its application, electrical circuits, magnetism and electromagnetism, simple electrical generators, electromagnetic generators, circuit elements, power and heating effects, electric motors, transformers and rectifiers, electrical measuring instruments, automation electrical devices and transistors. Electrical circuitry and fault finding. A wide range of small heating and motor-driven appliances are dismantled and repaired.

EL 200/Alternating-Current Machines
Principles of polyphase induction motors; construction; stator and rotor windings; slip and rotor frequency; developed power and torque; starting torque and current; losses and efficiency; speed regulation; standard test procedures; circle diagrams and equivalent circuits; starters and starting methods. Single-phase-motor construction, operation, and testing; motor selection. Construction and operation of synchronous alternators; voltage regulation; voltage control; losses and efficiency; alternator test procedures; parallel operation; synchronizing methods. Synchronous-motor construction and operation; test procedures; starting methods. Special synchronous machines. Power-factor improvement through synchronous machines.

EL 202/Electrical Laboratory and Installations
Voltage, current, and power in balanced three-phase circuits; transformer operation; polyphase transformer connections; operation of DC generators and motors; DC motor starters; operation of polyphase induction motors; operation of synchronous generators and motors; AC motor starters. Installation methods for electrical equipment circuits, lighting fixtures and outlets, and including Lomax, BX, Conduit and Pyrotennax Branch circuiting. Main service installations for single and three phase systems for residential, commercial and industrial buildings. Installation of low voltage control systems.

EL 203/Power and Distribution
Three-phase systems; measurement of current, voltage, and power in balanced three-phase systems and single-phase circuits. Power-factor improvement. Primary and secondary distribution systems; distribution methods and equipment. Circuit protection and protective equipment; protective relaying systems. Metering systems and equipment. Street-lighting systems and equipment. Automatic voltage control.

EL 204/Electrical Machines
Construction of DC machines; DC field and armature windings. Induced EMF; commutation: operation of shunt, series, and compound generators; applications; parallel operation. Special DC generators. Operation of shunt, series, and compound DC motors; motor selection. Motor starters; DC contactors and relays. Construction of single-phase transformers; transformer operation; polyphase connections and three-phase transformers. Construction of polyphase induction motors; induction-motor operation. Motor starters; braking systems. Single-phase motor construction and operation. Construction and operation of synchronous motors and generators. Special AC machines. Motor selection. AC contactors and relays.

EL 205/Power and Distribution
Polyphase systems; balanced and unbalanced three-phase loads; power, power factor, and power measurement; power-factor improvement. Transformer construction and operation; equivalent circuits and phasor diagrams; losses and efficiency; voltage regulation; test procedures; parallel operation; polyphase transformer connections; three-phase transformers. Primary and secondary distribution systems; street lighting.

EL 206/Industrial Electronic Control
Construction and operation of gaseous tubes; applications of gaseous tubes. Construction and operation of semi-conductor devices; applications of semi-conductor devices as rectifiers and amplifiers. Timing circuits and relays. Electronic motor-speed controls. Magnetic amplifier construction, operation, and application. Inductive heaters. Resistance welders and welding controls. Servomechanisms and servo systems. Pneumatic and hydraulic control systems. Integrated control systems.

EL 207/Electrical Lab II
Experimental proofs for the fundamental concepts of polyphase circuits; polyphase transformer connections; transformer testing; polyphase induction-motor tests; induction generators and frequency converters; synchronous-alternator operation; alternator tests; parallel operations of alternators and synchronizing; synchronous-motor operation and testing; special AC machines; motor starting methods; braking systems; operation of gaseous tubes and circuits utilizing gaseous tubes; semiconductor operation; semiconductor circuits; magnetic amplifier operation; resistance welders; servomechanisms; electronic motor-speed controllers; fluidic controls.

EL 210/Electronic and Pneumatic Controls
Electron tubes, diodes, triodes, pentodes, power supplies, audio frequency output stages, detection, intermediate frequency amplifiers, oscillators, converters, RF amplifiers, superheterodyne receivers, applied physics, pneumatic and electronic transmitters, pressure, level, flow and temperature control theory, proportional reset and derivative, temperature measuring devices, filled systems, thermocouple resistance bulbs, potentiometers, wheatstone bridge, radiation, analysis, speed, pH, humidity chromatography, oxygen analysis, control valves.

EL 221/Electrotechnology
DC machines, generators, motors, excitation starters. Illumination, Kirchhoff's Laws, inductance. Introduction to AC theory, vector analysis, AC instruments.

EL 222/Electrotechnology
AC theory, parallel circuits, resonance, power factor, three-phase circuits, star and delta connection, DC generators, and motors, lap and wave armature reaction commutation, inter-poles. Characteristics of Shunt: series, compound, paralleling, load-sharing, testing.

EL 304/Electrotechnology
Time bases, time base controls, electro-static deflection, cathode follower circuits, Miller time base generators, electro-magnetic deflection, strobe pulse, electronic aids.

EL 321/Electrotechnology
Transformers, single and three-phase, auto, double-wound, rotary types, EMF equations, losses and efficiency, regulation. Instrument transformers. Alternators, construction and principles, single and three-phase, simple windings, testing synchronizing load-sharing.

EL 322/Electrotechnology
Synchronous motors, principles, starting. Vee curves, operation, testing, construction. Induction motors, construction operation, three-phase motors of cargo and wound types, TS curves, starting, speed control, switch gear.

ELECTRONICS TECHNOLOGY

ELTC 100/Electronic Fundamentals
An introduction to two and three-element semiconductor devices with some attention to the analogous vacuum-tube devices. The topics will include the physical behaviour, graphical analysis and equivalent circuit analysis of these devices.

ELTC 101/Amplifiers
Amplifier circuits (tube types): stage gain, coupling methods, classes of operation, bias methods, load lines, power amplifiers, phase inverters, tone controls, distortion, types and causes, DB gain, IF amplifiers, grounded grid.

ELTC 102/AM-FM Receiver Circuits
Television principles: introduction to television station systems, camera tubes, video signal structure, general receiver characteristics, CRT, deflection circuits, high voltage section, sync circuits, video amplifier detector and AGC, video IF amplifiers, FM sound circuits, power supplies, tuners and antennas. Principles of FM: producing FM mechanically, FM terms and definitions, comparisons between AM and FM, reactance modulation, FM detectors, pre-emphasis and de-emphasis, FM detector alignment, FM receivers, FM stereo.

ELTC 103/Semi-Conductor Circuits
Basic transistor principles: review of atomic theory, semiconductor physics, doping, semi-conductor diodes, bias techniques, transistor action, transistor configuration, amplifier circuits (transistor types); transistor characteristics, bias stabilization, transistor load lines, power amplifiers, phase inverters, complementary symmetry.

ELTC 104/Electronics
Electrical measurements; induction; capacitance; AC theory; reactance; capacitive reactance, impedance, resonance, transformers; various construction projects.

ELTC 105/Television Principles
A comprehensive study of television as a complete system. Encompassing such topics as composite video, tuners, intermediate frequency amplifiers, sync circuits, video amplifiers, deflection circuits, sound section, and picture tube.

ELTC 106/Introductory T.V. Broadcast
Audio *1*, Basic system-block diagram-consoles, DB-VU, Audio terms, Impedance-matching-Bal audio, Jackfields, Attentuators.

Audio *2*, Installation practices, Shielding and grounding-ground loops, Microphones, Turntables, Audio tape recorders, Noise-Distortion analyzers, Wow and flutter measurements, Intercom-basic.

Synchronization, sync. generator-purpose, Sync. generator system block, Pulse-EIA RS 170, Composite signal standards, Pulse cross display, Genlock, Unipulse-R.H.L. C.D.L.
Video Systems *1*, System-block diagram, Typical systems-simple, interval, Stab amplifier, VTRS, Network, Transmitters, Color-black and white monitors.
Video Systems *2*, Impedance-matching-coaxial cable, Standard levels, Bandwidth, Wave form monitors, Special effects, CCTV.
Video Systems *3*, Color bar, Vectorscope, Test signals analysis-sin 2-T pulse-2T pulse-K factor, Window, Stairstep modulated, Vertical interval test signal, 2500 MHZ.

Cameras *1*, Pick-up tubes-J.O., vidicon, Plumbicon-care and feeding, Black and white camera-description, Storage-lag.
Cameras *2*, Vidicon mono camera for telecine, Films for TV, Projectors 2-3 pulldown, Multiplexers, Vidicon alignment.
Cameras *3*, Color camera – 2, 3 and 4 tubes, Encoders, Alignment.

Summary and Discussion.

ELTC 110/Electronic Fundamentals
Semiconductor Physics, Semiconductor Diodes, Transistor Amplifiers, Transistor Oscillators, Semiconductor Control Devices, Diode Tubes, Vacuum Tube Operation, Vacuum Tube Characteristics, Vacuum Tube Amplifiers, Vacuum Tube Oscillators, Basoc Power Supplies, Electronic Meters, Cathode Ray Tubes, Oscilloscopes, Power Transfer and Impedance Matching.

ELTC 130/Electrical and Electronic Fundamentals
Energy, Electricity, Resistors and Conductors, Cells and Batteries, Voltage, Current and Resistance, Ohm's Law, Electric Power, DC Circuits, Kirchholl's Law, Capacitors, Electromagnets, Inductors and Induction, Lenz's Law, AC Source, Vectors, Reactance, Impedance, Resonance, AC Power, Electric Meters, Transformers, Resonant Circuits, AC Circuits, Transducers, Vacuum Tube Operation, Vacuum Tube Characteristics, Basic Power Supplies, Electronic Meters, Cathode Ray Tubes, Oscilloscopes, Power Transfer and Impedance Matching.

ELTC 131/Semiconductors Devices and Circuits
Atomic structure of semiconductors, Diode junction, Avalanche and Zener Breakdown, Zener diodes, Tunnel diodes, Junction transistors, Field-Effect transistors, IGFET (MOSFET) Special handling precautions for FETs. Transistor amplifiers, coupling methods, Power amplifiers, Transistor oscillators, Unijunction transistors. Silicon controlled rectifiers, Surge and transient suppressors, Semiconductors Data sheets, Integrated circuits. Testing and evaluation of semiconductors devices.

ELTC 132/Radio H.F. and Sound System
Communications Systems, Amplitude Modulation, Frequency Modulation, Demodulation and Detection, Troubleshooting and Maintenance, Test Equipment, Troubleshooting Radio Receivers, Servicing Techniques, Servicing Automobile Receivers, AM/FM Receivers, Radio Receiver Alignment, Sound Systems, Record Changers-Pickups, Tape Recorders.

ELTC 133/Fundamentals Laboratory
Parts Familiarization, Construction Techniques, Circuit Tracing, Meter Testing and Calibration, Construction of AC, DC, and Audio Circuits, Low and High Frequency Oscillators, Use and Calibration of Signal Generators.

ELTC 134/Pulse and Digital Circuits
RC Circuits. LR Circuits. Relaxation oscillators, Blocking oscillators, Multivibrators, Sawtooth generators, Flip-flop, Binary counters, Decimal counters, Clippers, Limiters, Shapers, Triggering circuits, Gating-circuits.

ELTC 135/Television Receiver Circuits and Systems
Television System Requirements, Tuner Circuits, VHF Tuners, Video IF Section, Video Amplifiers, Picture Tubes, Sound Channels, Sync Signals, Sync Circuits and DC Restorers, Sweep Oscillators, Sweep Amplifiers, High Voltage Supplies, AFC Circuits, Automatic Gain Control, Low Voltage Supplies, UHF Tuners, Antennas, Transmission Lines, Complete Television Receivers, Servicing Techniques.

ELTC 136/Color Television and FM Multiplex
Color, Color TV Receiver Picture Tubes, Color Television Signals, Color Television Receivers, Color Sync Circuits, Color Tube Circuits and Assemblies, Color TV Test Equipment, Color TV Receiver Installation, Troubles Affecting the Mono-Chrome Picture, Troubles Affecting the Color Picture, Color Receiver Alignment, Stereo Sound Systems, Stereo FM Multiplex, FM Detectors, Magnetic Recording, Compensating Networks, Tone Controls, Reproducers and Enclosures.

ELTC 137/Radio and Television Laboratory
Adjustment, Maintenance, Servicing, and Installation of Domestic Equipment including: Record Changers, Tape Recorders, Stereo and PA Amplifiers, AM, FM, and Multiplex, TV, Color TV, Solid State Equipment.

ELTC 200/Transistors
Hybrid Parameters and equivalent circuits for the CE, CB and CC configurations; small signal cascade amplifiers, gain equations, graphical analysis – Compound connected and complementary differential and operational amplifiers; Switching characteristics; Special semiconductor devices and circuits.

ELTC 201/Pulse Circuits
Wave shaping circuits including wave analysis, time constants, steady state and transient conditions; clippers, limiters and clampers. Multivibrators; Sawtooth generators; Step counters and Blocking Oscillators.

ELTC 202/Computer Principles
Computer arithmetic, including binary and octal, addition and subtraction, coded notation and subtraction using complements: Logic circuits, types and symbols, And, Or, Nor, Nand, circuits; Diode and Transistor matrices; Basic registers, Adders and Subtractors, exclusive Or gates, half adders and subtractors; Ven Karnaugh and Veatch diagrams; Basic computer systems, memory units, arithmetic units, input/output, control, programming.

ELTC 203/Communications Principles
Amplifiers, Oscillators, AM and methods of Modulations, AM transmitters and receivers, SSB theory and analysis of a typical SSB Transceiver system; FM, Direct FM transmitters, Phase modulation (indirect FM), FM receivers.

ELTC 204/Radio-Telephone
Circuits and circuitry, the output stage and loudspeakers, the antenna and input stage, the power supply, the direction finder, block diagram, principal, care and maintenance, operation, the echo sounder, principal, block diagram, care, maintenance and operation. The radio telephone, block diagram, care, usage and maintenance, requirements for a radio telephone licence. Laboratory: Projects shall include the crystal radio set, the simple superheterodyne receiver, the simple two tube receiver, circuitry and power control.
One Semester

ELTC 205/Navigation Equipment
The Gyro Compass, operation, use and maintenance. Radar, its operation, use and maintenance, advantages and disadvantages, relative and true motion displays, exercises in navigation and plotting on the radar simulator. The Decca navigator, principles of operation and operation and use of equipment and charts. Loran, usage and use of Loran charts, principles. General subject review.

ELTC 211/Computer Systems
Advanced register systems, computer memories, Peripheral equipment including Teleprinters, high speed printers, tape transports, card and tape equipment, numerical and graphical displays; Computer programs, flow charts and program languages; Analog computers, Computer control systems.

ELTC 212/Communications Systems
Microwave Techniques, transmission lines, microwave propogation, waveguides and waveguide hardware, methods of energizing waveguides, waveguide components, microwave tubes, measurement techniques; Radar basic theory, typical radar systems; Multiplexing, Frequency division; Microwave links, Facsimile; Teletype, Closed circuitry; Antenna fundamentals and methods of antenna feed; Coupling Circuits; Types of Antennas.

ELTC 213/Laboratory
In each course and each area of specialization, laboratory periods will be given. The laboratory exercises have been developed so that they reinforce the material given in theory. Also, the laboratory exercises emphasize measuring techniques and principles. Because of the ultimate goal in Engineering Technician training, "hands on" laboratory training is considered essential and, therefore, this phase of the course is considered to be a major area of study.

ELTC 215/Audio Systems Theory and Equipment
Audio measuring equipment; Audio lines including losses, matching, balancing, shielding and grounding; Audio amplifiers, Audio transducer principles and applications, stereo systems; Audio control consoles; Audio tape recorders; intercommunications systems, studio acoustics.

ELTC 216/Video Systems and Transmitting Systems, Theory and Equipment
Sync. generator; Genlock and color lock; Pulse amplification and distribution; Video signal composition and standards, NTSC generator signal and vectorscope analysis; signal distribution, matching and matching systems; Video and waveform monitors, Video amplifiers, Video switchers; Stabilization and processing amplifiers; Vertical interval test signal techniques. Transmitting systems and functions; Transmitter analysis and standards; Transmission lines and antenna design principles; Propogation patterns and radiation measurements; UHF and VHF reception and interference characteristics; Basic microwave systems and Basic CATV systems.

ELTC 217/T.V. Cameras, Tape Recorders and Telecine Theory and Equipment
T.V. monochrome and Color Cameras; image conversion tubes characteristics and functions; monochrome camera chain functions and circuit analysis; Color camera chains systems and circuit analysis; Matrixing devices; Camera lens systems and illumination. Video tape systems; wideband recording techniques; Rotating head principles and scanning; Video tape system requirements, Video signal processing; Operational and maintenance procedures; Chroma signal recording methods and principles; Functional analysis of Intersync, Amtec, Colortes and tape editing. Film techniques and telecine equipment; Film sound (optical and magnetic); dubbing systems; film development and printing principles, Video film projectors and telecine chains; Monochrome and Color telecine camera chain circuits analysis. Film recording of video signals.

ELTC 218/Test Equipment Theory and Practice
Function and usage of oscilloscopes and probes including waveform monitors, vectorscope and stairstep generators, Test equipment function and adjustments. T.V. picture waveform fault recognization and analysis; Regular and emergency power distribution tests; Safety measures.

ENGINEERING (MARINE) TECHNOLOGY

EN 101/Engineering Practice
Fundamentals of boiler design, mountings, furnaces, draught, fans, fuel systems and combustion.

EN 103/Applied Heat
Thermometry, heat units, specific heat, heat equivalents, transfer, laws of thermodynamics, energy.

EN 104/Applied Heat
Boyle's and Charles' Laws, Universal Gas Laws, gas constants, expansion and compression, specific heats of gases.

EN 105/Applied Mechanics
Mass, force, weight, scalar and vector quantities, British and Metric systems. Resultant and equivalent of forces: forces, resolution, triangle of, parallelogram of, moments, couples, levers, graphics.

EN 106/Applied Mechanics
Centres of gravity and centroids of area. Work power and energy machines. MAVR Friction laws and coefficients.

EN 107/Mechanics of Fluids
Density, relative density and specific gravity, Archimedes Law, fluid pressure, pressure head. Manometers venturi and orifice meters, flowmeters. Friction in pipes, viscosity, flow in open channels, steady closed conduit flow, unsteady flow. Laminar and turbulent flow, Reynolds number. Applications of fluid mechanics-measurement and control. Fluid machinery; rotodynamic machines-pumps and compressors. Machine selection including influence of economics. Characteristics of pumps, losses and efficiencies. Calculation of pump speed for head required.

EN 109/Metallurgy
Materials used in the construction of marine boilers and engines. Sources of various metals. Production methods of steel and iron. Castings. Steel and iron process. Steel and iron treatment. Various types of steel and iron. Steel alloys. Strength and composition of steel, iron and steel alloys. Properties of various ferrous metals. Testing.

EN 110/Metallurgy
Non-ferrous metals: sources and manufacturing methods, properties, treatments. Various alloys and their composition and properties. Strength and testing.

EN 201/Engineering Practice
Fundamentals and theory of: Reciprocating engines, their construction, operation and maintenance; work shop practice.

EN 202/Engineering Practice
Turbines: Impulse, reaction theory, construction, maintenance, condensers, gearing, shafting, and propellers. Workshop practice.

Semester *II Applied Chemistry:* The nature of matter, the three states of matter: elements, compounds and mixtures. Solutions and crystallization, evaporation. Physical and chemical changes, atoms and molecules and simple atomic theory. General properties of acids, bases and salts. Ionic dissociation and introduction to pH. Introduction to Organic Chemistry with reference to Screen Printing.

PHYS 135/Applied Physics
Properties of matter, structure of matter. Adhesion, cohesion, surface tension. Concept of force: hydraulics, pressure and density, Pascal's Law, principle of hydraulic devices, principle of pneumatic devices. Electrical fundamentals. Codes.
One Semester

PHYS 136/Applied Physics
Semester *I Heat and Temperature:* Effects of heat, temperature scales, heat units, specific heat, calorific values of fuels.

Semester *II Structure of Matter:* Elements, mixtures and compounds. Basic chemistry of combustion, chemical composition of fuels, combustion rates of fuels, transfer of heat.

PHYS 137/Applied Physics
Semester *I:* Work energy and power, horsepower, mechanical efficiency, torque, prony brake, belt and pulley drives, friction, bearing friction, laws of friction. Heat: effects of heat, mechanical equivalent, temperature, temperature conversion.

Semester *II Basic Electrical Fundamentals:* Ohm's Law, electrical circuits, cells, electromagnetism, electrical measuring instruments, thermocouples, induced voltages and transformers, auto transformers, electromagnetic generators, DC and AC motors, capacitors and capacitance.

PHYS 138/Applied Physics
Semester *I Classification and Properties of Matter:* Change of state; effects of temperature and pressure changes, refrigeration cycle, gauge and absolute pressure. Gas Laws: Law of Partial Pressures and Law of Volumes. Petrochemicals: properties and molecular structure of solvents and refrigerants. Properties of soaps and detergents: scale formation, electrolysis, corrosion, and preventive measures.

Semester *II Measurement:* Density, specific gravity, force and pressure. Lattice structure and mechanical properties of solids: stress, strain, and elasticity of materials. Measurement and transfer of heat. Effects of heat on solids and liquids; linear expansion, thermostatic controls and thermometry. Hydraulic devices. Simple machines: MA, efficiency, and friction.

PHYS 140/Applied Physics
Semester *I Forces:* Kinds, units, resultant, equilibrant, force systems; Principle of Momentum and couples, law, effects and coefficient of friction, centroid and centre of gravity. Work, energy and power: work done by constant and variable forces, principles, mechanical advantage, and efficiency of machines, gear and belt drives, Pascal's Law, hydraulic and pneumatic devices, potential and kinetic energy, equivalence of electrical, mechanical and heat energy, horsepower. Mechanical properties of materials: stress and strain, Hooke's Law, Young's modulus of elasticity.

Semester *II Heat:* Thermometry, effects and transfer of heat, specific and latent heat of metals. Classification of substances elements, compounds. Solutions and mixtures, physical and chemical properties of metals, electromotive series, corrosive of metals. Pure metals: crystalline structure of space, lattice units, allotropes, dendrites. Alloys: types of solid solutions, phases, effects of heat treatment, constitution of diagrams, metallic carbides and intermetallic compounds, formation of the eutectic and eutectoid. Magnets and magnetic substances. Light: reflection, refraction and dispersion of light, optical instruments and magnification.

PHYS 143/Science
Semester *III:* The solar system. The atmosphere. Earth history. Properties of water.

Semester *IV Heat:* kinetic theory, heat transfer, thermometry. Physical properties of matter, physical change. Changes of state. Composition of matter: elements, compounds, mixtures, and solutions. The atmosphere.

PHYS 146/Science
Semester *I Properties of matter:* changes of state, chemical and physical changes, mechanical and physical properties of materials. Properties and composition of air and water: density, specific gravity. Pressure: hydrostatic, atmospheric. Vibratory motion: nature of sound and light. Introduction to heat and thermometry.

Semester *II Heat:* thermometry, measurement of heat, changes of state, heat transfer. Force: units of force, principle of simple machines, types of forces. Work, energy and power. Electricity and magnetism: properties of magnets, electrostatics, current electricity, the electric circuit, electromagnetism.

PHYS 147/Science
Semester *I:* Measurement. Kinematics. Newtonian mechanics. Vectors: application to statics and dynamics; laws of friction. Mechanical energy: work, energy, power. Thermodynamics: thermal energy, heat engines, refrigeration, air conditioning. Material stress and strain: definition, units, determination of simple stress. Electricity and electromagnetism. Introduction to electronics.

Semester II: Physical and chemical changes, oxygen, nitrogen, hydrogen, water, solutions and mixtures, fundamental chemical laws, symbols, formulas, equations, ionization, carbon, fuels, sulphur, salt, halogens, periodic table, alkali metals, nitrogen and phosphorous, calcium and magnesium, chemistry in industry.

PHYS 150/Science
Metric system; density; specific gravity; electrostatics. Thermometers; heat; hydrostatics; measurement of pressure; vacuum pump; solids; liquids; solutions; sterilization and sanitation.
One Semester

PHYS 200/Modern Physics
Semester I Electromagnetism: The spectrum. Atomic physics: Bohr atom and line spectra, waves and particles, modern atomic model and Schroedinger wave equation, solid state physics, crystalline solids, classification by structure and by energy.

Semester II Structure and Behaviour of Metals: Physical states, alloy structure and behaviour of semi-conductors, theory of semi-conductors, semi-conducting materials, semi-conductor devices. Nuclear physics: introduction, relativity and the mass, energy equivalent, radioactivity, nuclear particles, nuclear energy.

PHYS 201/Physics
Light: reflection, mirror images, lenses, binoculars, telescope; refraction, index, dispersion; particle theory; waves studies; interference, Newton's law of motion: vectors, work, energy, momentum; heat.

PHYS 202/Thermodynamics
Semester I Energy Transformations: Definition of terms, the PV diagram. Laws of thermodynamics, the gas laws: characteristic gas equations, work done by gases, Joule's equivalent.

Semester II Indicator Diagrams: Calculation of thermal efficiencies, ideal engine cycles, comparison of engine efficiencies. Heat transfer: conduction by radiation. Entropy: changes of state, isobaric, isochoric, isothermal, abiabatic, and polytropic.

PHYS 210/Applied Physics
Semester I Hydraulics: Principles of hydraulic devices and systems. Pneumatics: principles of pneumatic devices and systems.

Semester II: Principles of electrical systems and operating principles of electrical devices. Fundamentals of computer analysis. Codes and safety.

PHYS 310/Physics
Principle of the hydrometer, use of the hydrometer, in shipboard practice, effect of expansion and contraction in liquids and relationship to liquid cargos, a review of hydrostatics and heat, problems from general science. The manometer, thermometers. Review problems from general science. Anometers, the vector principle in anometers, light in relation to its usages in navigation.
One Semester

PHYSIOLOGY

PHY 100/Physiology
Introduction to physiology; physiological concepts, digestion and nutrition, body fluids; body framework, circulation and respiration; excretion; reproduction; the nervous system; metabolism. Lecture = 3; Laboratory = 3 hours per week.

PLASTICS

PL 100/Materials/Thermoplastic
Fundamentals and characterization of polymers. Introduction to basic resins. Engineering thermoplastics and natural polymers. Identification of plastics and elastomers by simple tests.

PL 103/PL 132/Materials/Thermoset
History and introduction to polyester and epoxy resins. Reinforcements and fillers. Composites. Strength of material definitions.

PL 110/Processes/Thermoplastic
Basic theory and application of thermoplastic processes. Mixing and dispersing, extrusion, injection moulding, calendering, blow moulding, sheet forming, sealing and welding, coating and machining.

PL 113/Processes/Thermoset
Theory and application of reinforced thermosetting plastic processes. Pattern and mould making, hand lay-up, spray-up, filament winding.

PL 120/Design/Thermoplastic
Design of plastic parts and processing equipment. Materials selection. Selection of a process. Part design, injection mould design, extrusion die design, design of moulds for hollow formed articles, auxiliary equipment.

PL 123/Design/Thermoset
Design characteristics for glass fibre reinforced plastics. Throw-away and plastic tooling. Reinforced plastic moulds and tooling. Wooden and metal moulds. Cost estimating.

PL 125/Plastic Fundamentals
Materials, processes, design, thermoplastics, and thermosets.

PL 130/Materials/Thermoplastic
Introduction to basic resins. Engineering thermoplastics and natural polymers. Identification of plastics and elastomers by simple tests.

PL 131/Materials/Thermoplastic
Thermoplastic sheets, rods, tubes and profile shapes. Solvents and adhesives. Properties of polyvinyl chloride, acrylics, polyethylene, polypropylene and other materials used in forming and fabricating of thermoplastics.

PL 132/Same as PL 103

PL 133/Processes/Thermoplastic
Basic theory and practice in the operation of processing equipment. Extrusion; injection and blow moulding.

PL 134/Processes/Thermoplastic
Basic theory and practice in the operations of sheet forming, sealing and welding, casting, coating and machining of thermoplastics.

PL 135/Processes/Thermoset
Theory and practice in pattern and mould making, hand lay-up, spray-up, filament winding.

PL 136/Design/Thermoplastic
Mould and die design, machine design. Cost estimating.

PL 137/Design/Thermoplastic
Design of machines, jigs and fixtures, tooling. Cost estimating.

PL 138/Design/Thermoset
Throw-away and plastic tooling. Reinforced plastic moulds and tooling. Wooden and metal moulds. Cost estimating.

PL 139/Design/Thermoset
Mould and die design, machine design. Cost estimating.

PL 140/Same as PL 203

PL 141/Processes/Thermoset
Theory and application of moulding thermoset materials. Matched die moulding, compression moulding, transfer and injection moulding.

PL 200/Materials/Thermoplastic
Fluorine polymers. The new plastics. Reinforced thermoplastics and elastomers. Material testing. Product testing. Material selection.

PL 203/PL 140/Materials/Thermoset
Properties, chemistry, curing and quality control for thermosetting resins. Polyesters, epoxies, alkyds, phenolics, silicones, amino resins, furanes and polyurethanes.

PL 210/Processes/Thermoplastic
Advanced theory and application of thermoplastic processes. This course covers the same processes as listed in PL 110, but in greater depth.

PL 211/Processes/Thermoset
Theory and application of moulding thermoset materials. Matched die moulding, compression, transfer, and injection moulding.

PL 220/Design/Thermoplastic
Advanced design—process selection, mould and die design, product design. Auxiliary equipment, jig and fixture design. Cost estimating.

PL 223/Design/Thermoset
Mould and die design, machine design. Cost estimating.

PLASTERING

PLAS 10/Plastering I
Job conduct, responsibilities, tools of the trade, aggregates, gypsum, limes and portland cement, plaster backings, solid partitions, fire ratings, types of arches, related geometry, layout, areas and estimating, construction of small moulds and bench work.

PLAS 20/Plastering II
Duties of a mechanic, duties of a foreman, use of spirit and water level, squaring of rooms, flat and beamed ceilings, running of moulds, cutting and planting run bench work, mitring, stops and returns, repair work.

PLAS 30/Plastering III
Layout for grain and dome ceilings, related geometry, arches, mitring, acoustic tile layout, different types of moulds, acoustic materials, safety practices, texture work, small castings.

PLUMBING

PLUM 10/Plumbing I

Safety precautions, steel pipe, measuring pipe, linear measure, calculation of 45 offset, lead, solder, and fluxes. Types of cast iron joints, hand tools and wrenches, heat transfer, properties of water, copper D.W.V., cast iron M.J., fundamentals of a good plumbing system, drainage terms, building trap, cleanouts and location, purpose of a drain plan. How to draw a drain plan, drain design, sanitary (function of) floor drains, storm (function of) RWL foundations drains, municipal sewers, municipal drains, underground and above ground drainage materials. Joining dissimilar pipe material, pipe supports and managers. Purpose of stack elevation, plumbing fixture traps. Component parts of a stack pipe, stack footings, roof flashings, stack terminals, purposes of venting, siphonage, trap seal loss, glass pipe demo, requirements between a fixture trap and vent. Trap and vent sizes. Prohibited fittings and connections, types of individual vents, upper and lower vent connections, dual venting, how to draw a stack elevation, stack elevation, simple wet venting, fixture units and hydro loads, assignment work, simple group vent sizing.

PLUM 20/Plumbing II

Residential HW tanks and heaters, British thermal units, T. and P. valves, temp. conversion review and expand waste and vent size, review stack elevation work, expand on stack venting, stack elevation, domestic dish and clothes washers. Class I floor drains, methods of mechanical priming, drain plan, grading waste pipes, valves, location of valves, water services, meter and bypass, WC bowls, areas and volumes, pressures and heads, basic pumps, WC tanks and ball cock valves, rough-in fixture cuts, combined drainage system, drains on filled ground, datum line, instrument readings, grading assignment work, blow down tank, oil interceptors, sumps and ejectors, loop and circuit venting, stack elevation, yoke venting, offsets in stacks, combined vent terminals, grease interceptors, sleeving.

PLUM 30/Plumbing III

Pressure and heads, commercial HW tanks, indirect heaters, Domestic HW circ. lines and pumps, water hammer, water supplies to high buildings, pressure reducing valves, tempering valves, cross connection, source of water, well pumps, hydro pneumatic systems, water softeners including demonstration, fire line installation, water pipe testing, special fixture trap locations, indirect and special wastes, corrosive drainage materials, septic tanks, disposal beds, rolled offset, friction loss in water piping, semi-combined drainage system, municipal water treatment, hospital fixtures, ventilation of washrooms. Rigging, pipe sizing and maintenance, isometric piping drawing and material take-off.

PROSTHETICS AND ORTHOTICS

PROS 100/Introductory Orthopaedics

Early surgical techniques and their modern development. The development of prosthetic and orthotic devices including: below the knee, above the knee and upper extremity prostheses; upper extremity, lower extremity and spinal orthoses.

PROS 101/Materials and Shop Techniques

A practical study of the hand and machine fabrication of components from ferrous and non-ferrous metals, plastics, leather, fabrics and plaster. This will include the techniques of filing, reaming, tapping, machine tool practice, forging and heat treatment of metals.

Reinforcing materials, hand lay-up procedures, vacuum forming, fastening, polishing and buffing of plastics.

The making of paper patterns, seams, stitching types, draping, felting and moulding of leather and fabrics; the manufacture of plaster moulds and models including the use of plaster bandages, as well as the types and applications of adhesives and other fastening devices.

PROS 200/Orthotic and Prosthetic Techniques

Casting, moulding, modifications, laminations, fabrication, installation of hardware and jigs in preparation for use by patients, including prosthesis and orthesis for upper and lower extremity deficiencies.

PROS 202/Materials and Shop Techniques

Properties of materials such as wood, leather, metal and plastics and their clinical applications in various types of prostheses.

PROS 203/Field Practice

Participation in various clinics, amputees assessment, formulating prescriptions, working with other members of the rehabilitation team. Visits to recognized establishments and working in a practical environment.

PROS 300/Advanced Orthotic and Prosthetic Techniques

Application of immediate post operative prosthesis, continuing programming, modular prosthetics. Plastizotes, silicones, vitrathenes and new materials as they are introduced.

PROS 301/Physical and Occupational Therapy

Patient treatment with considerations given to levels of activity, age, occupation and eventual rehabilitation into society.

PROS 302/Research Project

The project will enable the student to apply his theoretical knowledge and practical ability to the design, fabrication, testing and acceptance of prosthetic/orthotic components to meet the requirements and standards of the profession.

PROS 303/Field Practice

Involvement with patients for the actual fitting, design and fabrication from prescription with consideration given to clinical assessment, in conjunction with certified member of Prosthetic/Orthotic profession.

PSYCHOLOGY

PSY 160/General Psychology

This is an introductory course. Study of the response capabilities of human beings leads to consideration of human motivation, perception and the learning process. Theories of personality development and the concept of roles are discussed. The nature of intelligence and psychological testing together with the meaning of elementary statistical terminology are related to the study of children.

PSY 200/Psychology

A general introductory course to the study of human behaviour with consideration given to human motivation, perception, and the learning process. Theories of personality development, the concept of roles and the nature of intelligence will be discussed.

One Semester

PSY 201/Business Psychology

Formal and informal organizations. Consumer motivation. Consumer analysis, depth interviews, attitude and opinion surveys. Theory of psycho persuasion.

One Semester

PSY 202/Psychology

Clinical approach to the new amputee. Basic understanding of some of his problems and how to deal with them.

Environment and family acceptance of amputees.

PSY 203/Rehabilitation

Pre-prosthetic training and post-operative care. Clinical assessment with members of the rehabilitation team.

Immediate post-operative fittings, continuing treatment in socket design to keep patients ambulatory.

Stump conditioning and exercise.

PSY 204/Industrial Psychology and Salesmanship

A study of the application of psychological methods and principles in business and industry. Personnel selection, factors involving efficiency. Factors in selling process: buying habits, motives. The pre-approach, the approach, the presentation, the close.

PSY 205/Applied Psychology

As related to patient management. Procedures involving children and adults in the reception area, operatory, and business office.

REFRIGERATION AND AIR CONDITIONING

REF 10/Refrigeration and Air Conditioning I

Introduction to refrigeration history and development, thermodynamics functions and mechanical principles. Heat and temperature definitions, types of systems, refrigeration cycle, properties of refrigerants, handling of refrigerants, safety factors, compression system, types of components, evaporators, condensers, receivers, compressors, refrigerant flow controls, expansion valves, accessories, system servicing, charging and purging of systems. Refrigerant oils, installation procedures of special components, heat exchangers, accumulators, oil separators, water regulating valves, initial introduction to operation of cooling towers, evaporative condensers, early stages of psychrometrics; terminology and charts.

REF 20/Refrigeration and Air Conditioning II

Control operation, pressure and thermostatic, use of external and internal equalized valves, pressure controls, operating and limit, temperature, direct and remote applications, safety controls, DC and AC motors, motor controls, test instruments, motor starting devices, refrigeration piping considerations, piping installations. Water treatment for cooling towers and evaporative condensers. System contamination, cleanout procedures; acids in systems, testing and cleanout procedures, methods of defrosting, insulation factors, thermal conductivity, installation procedures, air removal, leak testing, charging, control setting, service analysis and operation. Review of silver brazing practices.

REF 30/Refrigeration and Air Conditioning III

Air conditioning fundamentals, properties of air, comfort zone, effective temperatures, relationship of psychrometric terms, use of the psychrometric terms, use of the psychrometric chart and application, sensible and latent heating and cooling, load calculations, types of loads, use of tables, equipment selection, coils and condensing units, low temperature applications, freezing methods. Multiple systems, piping hook-up and operational requirement, multiple system accessories, evaporator pressure regulators, crankcase regulators, check valves. Centrifugal compressors, operation and service requirements. Dehydration of equipment, use of deep vacuums, survey of refrigeration principles, preservation of foods, storage conditions, temperatures, humidity, air motion, motion, product chilling, relative humidity. Air velocity, product shrinkage, pneumatic control systems. Review of silver soldering techniques, service analysis.

REF 130/Refrigeration Theory

Introduction to refrigeration, description of history of trade, refrigeration fundamentals, heat and temperature definitions, vapor compression system, refrigeration cycle, types of systems, properties and handling of refrigerants, safety factors, system components, evaporators, condensers, receivers, refrigerant controls, pressure and thermostatic valves, safety controls, thermometers and gauges, accessories, lubrication, air conditioning controls and principles, humidity characteristics, heat loads, wet bulb, dry bulb readings, electrical controls, motors, starting devices, electrical servicing, installation problems, use of tables and charts, troubleshooting.

REF 131/Refrigeration Practice
Tools of the trade, characteristics of silver brazing, brazing copper joints, brazing dissimilar metals, tube bending, practical project assignments, flaring copper tubing, compressor dismantling, identification of component parts, assembly procedure of compressors, electric motor inspection, electrical control inspection, purging, leak testing, charging systems, primary system installations, servicing installations.

SANITATION

SAN 10/Sanitation and Hygiene
Introduction to established minimum standards for plant sanitation and safety in food service. Legal safeguards in food sanitation, food-borne illnesses, personal hygiene and sanitation. General considerations relating to food-borne illnesses. Sanitation principles to do with all phase of food service.

SAN 11/Sanitation, Hygiene and Safety
Semester I: This program is designed to make the student aware of the individual responsibility of safety, sanitation and hygiene, when related to the production, storage, and disposal of all food stuffs cooked or in the raw state, commencing with fire and accident prevention, public health regulations, personal hygiene, the cleaning maintenance of all working and storage areas, food poisoning and its implications, pest and rodent control, the cleansing of all utensils that are used by the dining public, the awareness of contamination of foods by airborne and carried bacteria, and the safe use of detergents, deodorants and disinfectant materials.

SAN 100/Sanitation and Hygiene
Cause and prevention of food-borne illnesses. Sanitary maintenance of all areas of food service establishments. Sanitary handling of food, beverages, equipment and other materials in storage, preparation, and service. Proper use of various cleaning materials, illustrated by representatives of sanitation products manufacturers. Legal responsibility to maintain sanitation standards.

SAN 130/Sanitation, Hygiene and Microbiology Techniques
Types of organisms; food spoilage; bacterial growth; food poisoning; food borne organisms; methods of control; regulations; principles of hygiene; cleansing materials and methods.

SAN 131/Sanitation and Hygiene
Personal grooming and cleanliness, equipment sanitation, supplies available for sanitation, control of accident hazards. Health regulations pertaining to meat industry, types and causes of food-borne illness.

SAN 132/Sanitation, Hygiene and Safety
Semester I: This program is designed to make the student aware of the individual responsibility of safety, sanitation and hygiene, when related to the production, storage, and disposal of all food stuffs cooked or in the raw state, commencing with fire and accident prevention, public health regulations, personal hygiene, the cleaning maintenance of all working and storage areas, food poisoning and its implications, pest and rodent control, the cleansing of all utensils that are used by the dining public, the awareness of contamination of foods by airborne and carried bacteria, and the safe use of detergents, deodorants and disinfectant materials.

SAN 300/Sanitation and Pollution
Organization and supervision of a sanitation program in the food industry. Importance of and how to schedule a program. The chemistry of cleaning, detergency and types of cleaning compounds. Methods of disinfection and sterilization, mechanical and/or chemical cleaning methods, CIP and ultra-sonic methods. Sanitary aspects of buildings and equipment, water treatment, and supply. Waste treatment and disposal. Insects, rodents, etc., and their control. Inspection techniques and reporting.
Lecture = 2 hours per week.

SMALL BUSINESS MANAGEMENT

SBM 10/Small Business Management
Business mathematics; fundamental operations, interest, trade discounts. Basic bookkeeping; the balance sheet, classified financial statements, special journals. Business practice; retailing, contracts and credits, insurance, banking and interest, taxes, licensing and lease, causes of business failure, forms of organization, promotion plan and policies.
One Semester

SBM 132/Small Business Management
The following topics will be covered: Business Mathematics; Basic Bookeeping including journals, ledgers, financial statements, adjusting and closing entries, special journals; Business Organization; Business Law including contracts, taxation, customs, labor legislation, property; Sales and Advertising.

SBM 232/Small Business Management/Bookkeeping
Semester *I:* Balance sheet, journal and balance sheet accounts, journal profit and loss accounts, ledger, work sheet.

Semester *II:* Special journals, financial statements, adjustments, closing the books, accounts payable, receivable. Special bookkeeping project.

SBM 332/Economics
Semester *I:* Personal money management: pensions, Capital investment, budgeting, installment buying. Credit: extended credit to consumer, personal use of credit, assisting credit agencies. Business, personal insurance: insurance as a basis for investment, relation to estate planning.

Semester *II Banking:* Policies and application for single ownership business. Supply, demand: elasticity as it applies to merchandise. Business cycle: fiscal, monetary policies. Human relations: graduation to the business world, responsibility, discipline, effective use of personal qualifications, courtesy in correspondence. Government law and regulations: standards applicable in business, employment, advertising, and labelling. Sales: the role of the letter in sales.

SEWING

SEW 141/Industrial Power Sewing
The following topics will be covered: single needle straight sewing machine; machine maintenance; basic techniques in power sewing; familiarization with three special machines such as the one needle, two needle and blind stitch machines; machine maintenance; fabrication of plain and simple garments; application of acquired techniques with emphasis on both workmanship and speed.

SIGNWRITING

SIGN 130/Basic Signwriting and Introduction to Screen Printing
Materials used in the trade; selection and care of brushes and equipment, preparation of surfaces, letter practice, colour theory for signwork; trade drawing, design and layout, punctuating for signwriting, introduction to heraldry and gilding. General introduction to Screen printing, Hand cut stencil making direct and indirect stencil making, printing, hand and mechanical.

SHEET METAL

SM 10/Sheet Metal Mechanic I
Seams of trade, metals of trade, soldering coppers, forging and trimming copper, fluxes of the trade, rivets, cleats used in duct construction, equipment and tools, measurements, rules, tapes, etc., hand tools and their proper uses, hand operated bench machines, stakes of the trade and their uses. Basic pattern drafting; parallel line development of patterns for shop projects of the basic course.

SM 20/Sheet Metal Mechanic II
Shop safety, metals of the trade, new materials, bond allowances on heavy materials and aircraft sheet metal work, expansion metals, coping, flashing, metal roofing and seams used. Heating and air conditioning; meaning of air conditioning, process and comfort air conditioning; differences, control of climate, humidity and its effects, methods of heat travel, meaning of BTU Methods of finding heat loss and heat gain, furnaces; history of development: 100 BC to now, symbols used in duct design, residential duct systems, complete layout of typical small house. Pattern drafting. Radial line development and parallel line for projects fabricated.

SM 30/Sheet Metal Mechanic III
Duct construction materials, fasteners used in the trade, turning vanes used in elbows, construction of high velocity duct work, air conditioning and/or ventilation: definitions, psychromatic charts, fans and fan laws, static and velocity pressure, friction losses in fittings and meaning of the equivalent length, registers and grilles and pressure losses incurred, explanation of duct sizing methods, equal friction methods, static regain method, complete commercial and industrial duct layout by each method, types of equipment used. Pattern drafting advanced: radial triangulation methods of pattern development for shop projects fabricated in advanced course.

SHORTHAND

SH 100/Pitman Shorthand
To develop the facility of writing Pitman shorthand at speeds up to 100 wpm and of transcribing the shorthand notes on the typewriter. In the initial stages the emphasis will be on shorthand theory, common short forms, and phrases: later, office-style dictation and practice in transcribing notes on the typewriter will be introduced. Lessons are conducted in a modern shorthand laboratory.

SH 101/Machine Shorthand
To develop the facility of writing machine shorthand at speeds up to 100 wpm and of transcribing the shorthand notes on the typewriter. In the initial stages the emphasis will be on shorthand theory, common short forms, and phrases: later, office-style dictation and practice in transcribing notes on the typewriter will be introduced. Lessons are conducted in a modern shorthand laboratory.

SH 102/Legal Shorthand
To further develop the speed and accuracy of writing and transcribing shorthand notes of legal correspondence, reports, and documents, with emphasis on legal vocabulary building. Notes may be taken in either Pitman or Stenotype shorthand.

SH 103/Medical Shorthand
To further develop the speed and accuracy of writing and transcribing shorthand notes of medical correspondence, reports, and documents, with emphasis on medical vocabulary building. Notes may be taken in either Pitman or Stenotype shorthand.

SH 149/Shorthand (Pitman, Machine, Forkner)
An initial period is spent in the study of the theory of the system, accompanied by as businesslike dictation as possible within the bounds established by the vocabulary presented up to that particular time. In this way the development of speed in writing Shorthand is begun at a very early stage in the course. As the course progresses increasing emphasis is placed on the development of facility in writing and reading Shorthand notes in the 2,000 word vocabulary range with additional practice in a more extensive vocabulary. Attention is also given to form, correct spelling, work division, punctuation and proper English usage.

SCREEN PRINTING

SP 130/Screen Printing
Appreciation of basic layout, typography and illustration; hand cut stencil making. Preparation of direct and indirect stencils. Hand and machine printing on various materials and surfaces. Fundamentals of electric circuitry, printing-operation of the process camera. Line and half-tone film making.

STEAMFITTING

STEA 10/Steamfitting I
General introduction, safety rules, types of tools used, use and care of tools, types of piping and fittings, standard practice of measuring piping, types of valves and gauges, types of radiators, convectors, heaters and coils, expansion and cushion tanks, types of boilers used in hot water heating systems, sizing and erection of boilers, filling, testing and operating hot water heating systems, types of hot water heating systems, gravity hot water, open and closed, two pipe forced hot water, direct return reverse return, one pipe hot water, baseboard heating, radiant heating, snowmelting systems, upfed and downfed systems, basic principles of controls (hot water) methods of zoning systems.
History of heating, safety precautions, steel pipe, piping materials, pipe threads, thread and piping allowance, measuring pipe, type of hangers, hanger attachments, offset measuring, grading of pipe, expansion of pipe, transfer of heat, properties of water, temperature conversion, temperature and pressure, latent heat, specific heat, BTU calculations, valves, types of boilers. CI type and sizing, convectors, unit heaters, gravity hot water systems, direct return and reverse return, piping riser and mains, radiation below mains, expansion and cushion tanks, open to closed conversion, forced hot water systems and circulating pumps, special fittings, assignment, one pipe system, up feed, down feed, air cushion tanks (forced), single circuits, double circuit, multi-circuit, balancing systems, baseboard heating, piping elevations, isometric view, radiant heating, control.

STEA 20/Steamfitting II
Method of zoning, reasons, piping, template development, zoning piping, zoning special fittings, piping elevations, primary and secondary, convertor types, applications, three-way valves, properties of steam, boilers, one and two pipe steam system, steam traps, return trap system, return trap piping, return trap equipment, condensate return pump cycle, vacuum return pump cycle, recall temperature and pressure relationship, vacuum pump, piping, temple and development, accumulator tank, lift fitting and controls, sub-atmospheric system, heat balancer, control valve, differential controller, selector and thermostats, high pressure systems, high and low pressure systems, high pressure steam plants, super-heaters, economizers, injectors, condensers, etc.

STEA 30/Steamfitting III
Description of steam heating systems and basic principles of cooking, pneumatic controls, air-conditioning and power house work including one pipe systems, two pipe systems, vapour systems, return trap systems, condensate return pump, vacuum return systems, high and low pressure systems, types of boilers, boiler connections, supply and return mains, stop and check valves, boiler water supply and controls, feed pumps and injectors, blow down connections, types of safety valves, types and purposes of steam traps, feed water heaters, wet and dry returns, condensate receivers, accumulator tank, vacuum pumps, pressure reducing valves, economizers, air eliminators, separators, exhaustheads, condensers, evaporators.
Review of basic and intermediate course, high temperature, high pressure, hot water systems, theory of combustion, firing, fuels, refrigeration and air conditioning, gas code and fittings, rigging, introduction to pneumatic controls. Isometric piping, drawing and material take-off.

STRUCTURAL STEEL DRAFTING

STR 10/Structural Steel Drafting I
Force Systems: components, resultants, equivalence; centroids, equilibrium, force analysis of structures; stress, axial, shear, bearing: stresses on oblique planes; working stress and factor of safety; strain elasticity; shear and moment in beams, stresses in beams; drawing office procedure; fabrication of structural steel, plain material, specification; bolted connections; types of fasteners, shear and bearing in bolted connections; welded connections: weld types, welding symbols, stress in concentrically loaded welds. Smoley's parallel tables.

STR 20/Structural Steel Drafting II
Moments of inertia, radius of gyration, section modulus, flexure formula, stresses in built-up beams; deflection of beams, columns: Euler's equation, empirical formulas, design of beam bearing plates and column base plates. Fasteners in combined shear and tension; stresses in eccentrically loaded welds, special beam connections. Smoley's tables, column details.

STR 30/Structural Steel Drafting III
Combined axial and bending loads; eccentrically loaded columns; sloped and canted beam connections; moment connections; graphical and numerical stress solutions for axial stresses in trusses, truss panel point connections, bracing members, comber in trusses. Detailing of welded truss, welded plate girder. Smoley's tables.

STR 122/Structural Detailing
Review of basic drafting principles and equipment. The application of standard structural details for structural steel, reinforced concrete and timber construction for foundations, footings, columns, beams, slabs, joists, bars, etc. The preparation of design and detail drawings within the discipline of steel, concrete and timber in general.

STR 212/Structural Steel Problems and Drawing
Drafting office routines, shop practice, detailing and related design of bolted and welded connected column bases, column splices; skewed, sloped and canted beam connections, hip and valley construction. Practice drawing of suitable projects.

STR 213/Reinforced Concrete Problems and Drawing
Detailing and related design of various beam and column types, floor systems, retaining walls, spandrels, cantilevers, stairs, slabs. Preparation of design drawings, preparation of placing drawings from design drawings. Introduction to computer detailing, prestressed and precast concrete problems and drawings.

STR 214/Project Drawing
Project drawing from design sketches, specifications and standards to develop complete sets of structural drawings, design and detail drawings of entire structures such as commercial, industrial and institutional buildings with reinforced concrete and structural steel as the major construction materials. To prepare drawings of buildings using the systems approach with the following sub-systems: structure, atmosphere, lighting/ceiling interior space division, vertical exterior skin, plumbing, electri/electronics, roofing flooring. Study of existing system projects, such as Metro Toronto's "Study of Educational Facilities" (SEF) and others.

SURVEYING

SURV 100/Survey Computations and Drafting
Introduction, elements of surveying, ink drawing, mechanical lettering, Ontario Land System, bearings and azimuths, survey calculations, closures, missing courses, route location plans, topographical plans, site plans, contouring, profiles. Calculations of bearings and azimuths, plotting angles, interpretation of legal boundary notes, plot of simple boundary, survey monumentation, plot of elevations, contours, profiles, topographic details, tracing in ink, mechanical lettering, review of trigonometric ratios of right angles, logarithms, areas, closures, DMDs.

SURV 101/Plane Surveying
Fundamental principles of surveying, steel tapes, chaining methods, errors in chaining, basic construction of transit, use of transit, use of theodolite, producing line, traversing, levelling, level notes, stadia, field procedure for topographical surveying, and basic construction layout.

SURV 110/Surveying
Horizontal and vertical measurement, use of survey instruments, site plan development, sub division planning, zoning by laws, legal computations and graphics, stake out of buildings.

SURV 130/Surveying
Levelling, contours, profiles, gradients, topographic plans and symbols, site plans, azimuths, bearings, Ontario Land System, legal, plans, ink drawings.

SURV 200/Survey Computations and Drafting
Review of fundamentals and elements, legal surveys, plans for land exchange, easements, expropriation. Survey calculations, route location plans, profiles, gradients, vertical curves, cross sections and earth work quantities.

SURV 201/Advanced Plane Surveying
The field work required to produce good quality 3rd order control over a large area using geodetic co-ordinates with electronic equipment and second reading theodolite. The adjustment and computation of the results by regular methods and by electronic computer. The drafting of the final plan.
Curves: The selecting, calculating and laying out of simple curves. Typical curve problems with the greatest emphasis placed on intersections of curves with other lines. Transition curves and multiple curves. The use of computer in the solution of curve problems.

SURV 202/Photogrammetry
Theory of photogrammetry, history and development, stereoscopic observation, ground control methods, mapping procedures, mosaics, uses and applications. Ures, mosaics, uses and applications.

SURV 203/Practical Astronomy
Polaris observation for meridian, explanation, field procedure, calculation procedure, determination by astronomic observation of longitude, time, latitude, the Astronomic triangle, determination of the azimuth of a line, sun observation, correction, use of tables, calculation procedures, sufficient spherical trigonometry for the solution of all above.

SURV 204/Legal Surveying
Registry office; land titles office; history and development; types of documents and plans; government acts; expropriation procedures, plans; methods of registering; legal transfer and general procedures, deeds, description of township offices, field trips to registry, land titles and township offices.

TAPING/DRYWALL

TA 130/Taping/Drywall
Job conduct and safety regulations. Board application, tape and types of adhesives, tools, quantity take-off, fire ratings of wall and ceiling assemblies, arch construction and fabrication, sanding, priming sealer coats, textured finishes.

TESTING

TEST 100/Elements of Testing
Characteristics, application and limitations of tensile compression, impact, hardness and fatigue tests. Types, characteristics, application and limitations of visual inspection, dye penetrants, magnetic particle inspection, radiography, ultrasonics, eddy-current, infra-red and strain gauge testing.

TEST 200/Testing Techniques
The theory and application of the following non-destructive test methods; penetrant inspection, magnetic particle, radiography and fluoroscopy, ultrasonics, infra-red, liquid crystal techniques, strain gauges, and eddy-current systems.

TOOL DESIGN

TD 100/Jig Fixture Design I
Freehand sketching and machine drafting of basic jig and fixture designs, emphasizing current production methods and organizations.

TD 101/Jig Fixture Design II
Freehand sketching and machine drafting of advanced jig and fixture designs, emphasizing current production methods and organization.

TD 102/Jig Fixture Design III
Freehand sketching and machine drafting of assembly and welding jigs and fixtures and welding fixtures, emphasizing current production methods and organization.

TD 103/Jig Fixture Design IV
Freehand sketching and machine drafting of cutting tool design, multi-tool layouts and gauge design emphasizing current production methods and organization.

TD 110/Metrology
History and basic principles: basic instrumentation, dial gauges and test indicators, surface plates, micrometers and verniers, gauge blocks, optical instruments and testing. Surface finish screw threads, gears. Angular measurement, fixed gauges, air gauging, autometrology.

TD 200/Die Design
Freehand sketching and machine drafting of basic blanking, piercing and cut-off and bending dies.

TD 201/Die Design II
Freehand sketching and machine drafting of advanced blanking, piercing and bending dies. Introduction to basic draw dies.

TD 202/Die Design III
Freehand sketching and machine drafting of advanced draw dies and complex blank, pierce and bend progressive dies.

TD 204/Process Engineering
Process Engineering Functions: The selection of process of manufacture. Manufacturing sequence. Primary processes. The selection of manufacturing tools and equipment. Standard machine tools. Special equipment, integrated equipment and automation. Ordering systems, production control and cost estimates. Plant layout, economic factors, product flow, cost analysis and control.

TD 205/Die Design
Freehand sketching and machine drafting of basic blanking, piercing, cut-off, bending, draw and progressive dies.

TD 206/Quality Control
History and terminology. Conformance and design factors. Quality control tools and techniques. Statistics, testing, communications, inspection. Design review, cost analysis. Auditing, procedures, training, motivation. Tool and gauge control. special studies, field and shop complaints, standard, scrap and rework data. Variability and frequency distributions, normal distribution, probability. Graphical frequency distribution analysis, control charts, acceptance sampling.

TD 207/Industrial Engineering
History and background of modern industry; general aspects of industrial organization and management; principles of organization and management. Plant layout, location and construction; handling of materials. Production and inspection, quality control, control of production. Time and motion study; material control; plant and equipment safety. Industrial relations and incentive payments. Personnel selection, training, human relations and labour organization.

TYPING

TYP 148/Typewriting
Parts of typewriter; letters and characters of keyboard; technique; word division; centering, horizontal and vertical; tabulation; letter styles and punctuation; addressing envelopes; folding and inserting letters; carbon copy exercises; circular letters; programs and menus; bank and financial statements; electric typewriter practice; practice on transcribing units; typing legal documents.

TYP 149/Typewriting
The purpose of this course is to develop typewriting skills to achieve 50 wpm on 10-minute tests and to cover the theory of centering and tabulation for business letters.

TYP 152/Typewriting
To achieve a thorough mastery of the keyboard using the touch typewriting system; applications of practical typing including the letter styles, tabulation, centering, carbon copies, envelopes, business forms, erasures and corrections, squeezing and spreading, and duplicating. Speed to be attained: 40 wpm on 10-minute tests.

TYP 156/Refresher Typewriting
A review of keyboard and practical techniques–speed development. A review of Office Practice topics. As this is a Refresher course those topics stressed will depend upon the requirements of the individual student.

TYP 157/Typewriting and Office Practice
The objectives of this course are: (a) to achieve a thorough mastery of the keyboard using the touch system, plus basic typewriting setups; and (b) to achieve 45 to 50 wpm on 10-minute tests. Typing will be taught using the Lumisonic System–for both beginners and those having typed previously. Office Practice will be devoted to a discussion of business-oriented topics such as: business organization, sales, purchasing and accounting routines, office standards, filing systems and procedures, and duties of office personnel.
When typing ability permits, topics and typing assignments will be co-ordinated.

TYP 158/Typing
A general review of the keyboard, correspondence, tabulation, manuscripts with the main emphasis on speed development production typing. Where possible the topics in both English and Office Practice will be done with the typewriter thus increasing the actual time spent on the typewriter.

VARITYPING

VAR 144/VariTyping
Course covers complete operation of the VariTyper Machine (justification, tabular copy, leader lines, centering of headings, copyfitting, plotting and composing of forms), ruling by hand, layout and paste-up and operation of the VariTyper Headliner.

WATCHMAKING

WATCH 130/Theory of Watchmaking
Basic tools – care and maintenance. Measurements; English and metric systems; time measuring techniques. Oscillatory motion; the laws of friction; the laws of liquids and lubrication. Introductory hairspring theory. Lathe, its components, basic and advanced lathe operations. Files and filing techniques. Grinding, polishing and burnishing. Drilling and drill preparations. Pin pallet escapement.

WATCH 131/Watchmaking Skills
Maintenance of basic tools. Development of manual dexterity through project work. Graver sharpening and basic turning. Filing, drilling, grinding and polishing techniques. Pivoting, bushing, refinishing balance staffs of clocks and metres. Fitting clock hairsprings. Making pivots and pallet pins. Turning with accessories.

WATCH 132/Theory of Watchmaking
Clock construction; clock escapements, gearing, striking and chiming mechanisms, pendulum theory. Balance and hairspring theory (intermediate).

WATCH 133/Watchmaking Skills
Balance staff turning. General clock repair. Preliminary watch work; balance staking, poising and truing; hairspring colleting, truing vibrating and overcoiling (intermediate). Fitting regulator pins, booths, mainspring ends, barrel hook, hour wheel tubes, crystals. Bracelet fitting and repairing.

WATCH 230/Theory of Watchmaking
Theory of oscillatory motion, escapements, balance and hairspring theory, friction and lubrication. Watch jewels; production and function in the watch.

WATCH 231/Watchmaking Skills
Escapement matching, balance truing and poising. Colleting, truing vibrating and overcoiling wrist watch hairsprings. Bezel set and friction jewelling. Watch overhaul and lubrication.

WATCH 232/Theory of Watchmaking
Gearing theory, power supply and winding and setting mechanisms. Watch construction; cases, dials, hands, crowns and crystals. Watch regulators. Watch adjustments to mean time, position and isochronism. Calibre identification, material systems, shock proof devices. Influence of magnetism. Waterproofing and waterproof testing. Estimating repairs. Automatic and calendar watches; construction and principles of operation.

WATCH 233/Watchmaking Skills
Practical watch adjustments to mean time, position and isochronism. Fitting stems and crowns, mainsprings, staffs and hairsprings. Waterproofing and testing. Repairs to winding and setting mechanisms, dial train and power unit. General repair of standard, automatic and calendar watches.

WATCH 330/Theory of Watchmaking
Theory of watch design. Calibre analyses. Perpetual calendars. Novelty clock design. Stop watches and chronographs. Minute and quarter repeaters.

WATCH 331/Watchmaking Skills
Analyses of modern watches through disassembly and repair. Repair of complicated watches; timers, chronographs, complete phase calendars. Analyses and repair of unusual time pieces.

WATCH 332/Theory of Watchmaking
Theory of electro-mechanical watches and clocks. Electrical winding systems. Free pendulum clocks; design and performance. Electronic clocks and watches. Coil and magnet designs. Indexing systems, power supply systems. Quartz crystal oscillators.

WATCH 333/Watchmaking Skills
Disassembly, repair and adjustment of electro-mechanical clocks and watches. Repair and adjustment of free pendulum clocks. Repair and adjustment of electro-mechanical pendulum clocks. Servicing of electronic clocks and watches. Analyses of quartz crystal oscillators.

WELDING

WELD 10/Welding
Personal safety precautions, safety in handling and using oxy-acetylene equipment, welding terminology, assembly and disassembly of equipment, regulator pressures, flame adjustments, definition of various oxy-acetylene processes, basic weld joints. Practical exercises in fusion welding of mild steel in the flat position and manual torch cutting using oxy-acetylene equipment.

WELD 11/Welding
Arc welding safety precautions, arc welding terminology, care and use of auxiliary welding equipment, basic techniques used in the arc welding of mild steel, explanation of alternating and direct welding current, shielded arc electrodes and metal transfer. Practical arc welding of fillets in the flat and horizontal position with stringer bead and weave techniques using rutile type electrodes.

WELD 20/Welding
Review of Welding 10, construction of cylinders, construction and operation of welding and cutting torches, construction and operation of regulators. Practical exercises in fusion welding and braze welding in the flat and horizontal positions using oxy-acetylene equipment.

Weld 21/Welding
Review of Welding 11, electrode classification and color codes, factors governing the selection and use of arc welding electrodes, polarity, weld faults. Practical arc welding of fillets in the horizontal position with single and multiple pass techniques using iron powder and low hydrogen type electrodes.

WELD 30/Welding
Review of Welding 10 and 20, welding gases, weld faults, edge preparation, distortion, theory of oxy-acetylene cutting, welding and brazing of various metals. Practical exercises in fusion welding and braze welding in the horizontal and vertical positions, manual torch cutting using oxy-acetylene equipment.

WELD 31/Welding
Review of Welding 11 and 21, power sources, arc blow, plate and edge preparation, carbon arc gouging, arc welding procedures used for the welding of various metals. Practical arc welding of fillets in the horizontal and vertical positions using cellulose and low hydrogen type electrodes.

WELD 40/Welding
Review of Welding 10 and 20, welding gases, weld faults, edge preparation, distortion, theory of oxy-acetylene cutting, welding and brazing of various metals, manufacture of oxygen and acetylene, pipe joint preparations, oxy-acetylene welding rod specifications. Practical exercises in fusion welding and braze welding in the horizontal and vertical positions, manual torch cutting using oxy-acetylene equipment, welding of pipe in rolled and horizontal position.

WELD 41/Welding
Review of Welding 11 and 21, power sources, arc blow, plate and edge preparation, welding sequence, carbon arc gouging, expansion and contraction of metals, causes and control of distortion, testing of welds, testing of operators. Practical arc welding of fillets in the horizontal and vertical positions using cellulose and low hydrogen type electrodes, welding of butt joints in the flat and horizontal positions using cellulose and low hydrogen type electrodes.

WELD 51/Welding
Review of Welding 11, electrode classification and color codes, factors governing the selection and use of arc welding electrodes, polarity, weld faults. Practical arc welding of light gauge mild steel using rutile type electrodes.

WELD 61/Welding
Arc welding safety precautions, arc welding terminology, care and use of auxiliary welding equipment, basic technique used in the arc welding of mild steel, shielded arc electrodes and metal transfer, electrode classification, polarity, carbon arc brazing. Practical arc welding of various joints using rutile and cellulose type electrodes on heavy and light gauge mild steel, carbon arc welding on galvanized sheet.

WELD 71/Welding
Arc welding safety precautions, arc welding terminology, care and use of auxiliary welding equipment, basic techniques used in the arc welding of mild steel, shielded arc electrodes and metal transfer, electrode classification, selection and use of arc welding electrodes, explanation of alternating and direct welding current, polarity, power sources, arc blow, edge preparation. Practical arc welding of fillets in the flat, horizontal and vertical positions using cellulose type electrodes.

WELD 100/Pipe Welding Processes
Theory: Further study of oxy-acetylene, electric arc, tungsten inert gas and gas metal arc welding and their applications to pipe welding. Industrial and transmission specifications. Electrode specifications. Power sources. Use of special equipment. Pipe preparation, preheating and postheating, purging procedures, welding procedures, welding techniques on carbon steel, stainless steel and aluminum pipe. Weld testing, codes.

Practice: Introductory all-position butt and fillet welds on mild steel, using oxy-acetylene, electric arc, tungsten inert gas, and gas metal arc processes. Use of bevelling machines for pipes preparation. Electric arc welding on schedule 40 and 80 carbon steel pipe using cellulose and low-hydrogen electrodes. Uphill and downhill welding. Oxy-acetylene welding of pipe up to and including 4" diameter in all positions, tungsten inert gas welding of carbon steel pipe in all positions, gas metal arc welding of schedule 40 pipe using the uphill and downhill techniques. Weld testing.

WELD 101/Tungsten Inert Gas Welding
Theory: Description, characteristics, applications, safety. Power sources, auxiliary controls, coolants, torches, flowmeters, shielding gases, gas cups. Tungsten electrodes, filler rods. Joint design, metal preparation. Welding techniques for various types of metals in all positions, purging procedures, operation difficulties. Weld testing.

Practice: Welding carbon steels, stainless steels, and aluminum alloy, in all positions; using edge, corner, tee, lap, and butt joint preparations. Welding various joints in stainless and aluminum tubing. Weld testing.

WELD 102/Semi-Automatic and Automatic Welding Processes
Theory: Theory and operation of metal inert gas welding, CO_2 short circuiting, CO_2 fluxed core wire, open arc and submerged arc. Theory of resistance welding and semi-automatic and automatic applications. Power sources and auxiliary equipment. Selection of filler wire and shielding gases. Metal preparation and joint design. Purging procedures, welding techniques, correction of operating difficulties and maintenance. Weld testing.
Practice: Metal inert gas welding of aluminum in all positions. CO_2 short circuiting welding of carbon steels in all positions. Argon-oxygen welding of stainless steels in all positions. CO_2 fluxed core wire and open arc welding of carbon steels in the flat and horizontal positions. Semi-automatic submerged arc welding of carbon steels in the flat and horizontal positions. Weld testing.

WELD 103/Industrial Welding Applications and Shop Procedures
Theory: Theory and operation of fabrication processes including tools and equipment, measuring and layout, cutting, bending, grinding, punching, and drilling; use and design of jigs and fixtures. Theory of various welding applications including resistance, submerged arc, electroslag, thermit, atomic hydrogen, plasma arc, electric arc, oxy-fuel gas welding and cutting. Process and equipment selection. Quality control and codes, weld testing and inspection, estimating, shop and production planning, supervision.

Practice: Shop preparation and welding of assemblies involving the use of structural section, sheet, plate and pipe using electric arc, oxy-acetylene, TIG, and semi-automatic equipment. Setting up welding equipment. Laboratory practice in testing of weld specimens using the following standard destructive and non-destructive methods: tension, hardness, impact, fracture, bend, ultrasonic, magnetic particle, dyepenetrant, macroscopic, visual. Interpretation of radiographs.

WELD 130/Oxy-Acetylene Welding, Brazing and Cutting
Theory: Safety precautions, terminology. Assembly and disassembly of equipment, care of equipment. Types of flames and their uses. Joint design. Weld faults. Repair of castings. Handling of oxygen and acetylene. Testing of welds and operators.
Practice: Fusion welding and braze welding. Cutting with manual and semi-automatic equipment.
One Semester.

WELD 131/Electric Arc Welding
Theory: Safety precautions, terminology. Striking the arc, weld faults. Power sources, auxiliary equipment, care of equipment. Alternating and direct current, polarity, arc blow. Shielded arc electrodes and metal transfer. Electrode classification and color codes, electrode coatings, selection and use of electrodes, storage of electrodes. Plate preparation. Repair of castings, arc cutting and gouging. Testing of welds and operators, codes. Manufacture and uses of ferrous metals. Principal alloying elements. Identification of metals. Heat treatment, distortion.
Practice: Welding of all joints in all positions using various types of electrodes and various thicknesses of metal.
One *Semester*.

WELD 140/Oxy-Acetylene Welding, Brazing and Cutting
Theory: Safety precautions, terminology. Assembly, disassembly, care and maintenance of equipment; construction and operation of welding and cutting equipment. Types of flames and their uses. Principals of cutting. Manufacture, storage and handling of oxygen, acetylene and other welding gases. Joint design. Fusion welding and braze welding techniques used on various metals. Weld faults, repair of castings. Testing of welds and operators, codes.
Practice: Fusion welding and braze welding of all joints in all positions. Silver brazing on ferrous and nonferrous metals. Fusion welding of small diameter pipe, repair of castings. Cutting with manual and semi-automatic equipment.
Two Semesters.

WELD 141/Electric Arc Welding
Theory: Safety precautions, terminology. Striking the arc, welding techniques and procedures. Weld faults (causes and control). Power sources, auxiliary equipment, care and maintenance of equipment. Alternating and direct current, polarity, arc blow (causes and control). Shielded arc electrodes and metal transfer. Electrode classification and color codes, analyses of electrode coatings, factors governing the selection and application of electrodes, storage of electrodes. Plate preparation and joint design. Arc welding techniques for various metals, repair of castings, arc cutting and gouging, carbon arc welding and brazing. Testing of welds, testing of operators, codes.
Practice: Welding of all joints in all positions using various sizes and types of electrodes and various thicknesses of metal. Repair of castings, carbon arc gouging.
Two Semesters.

WELD 142/Fabrication
Theory: Preparation of plate, pipe and structural sections for welding. Welding procedure. Practical project work using pipe, sheet and structural sections fabricated to specification. Manufacture, composition and uses of iron, steel and other ferrous and non-ferrous metals. SAE specifications. Identification of metals. Heat treatment, distortion (causes and control).
Two Semesters.

WELD 143/Inert Gas Welding
Theory: Description, safety precautions, welding equipment, welding techniques.
Practice: Welding on carbon steel sheet, aluminum, stainless steel, using the tungsten inert gas process and practice welding with semi-automatic equipment using steel and aluminum filler wire.
Two Semesters.

WELD 144/Pipe Welding
Theory: Power sources, electrode specifications, pipe preparation, welding techniques.
Practice: Welding, using oxy-acetylene and electric arc processes.
Two Semesters.

WELD 145/Welding
Personal safety precautions, welding terminology, safety in handling and using oxy-acetylene equipment, assembly and disassembly of oxy-acetylene equipment, regulator pressures, flame adjustments, construction of cylinders, construction of operation of regulators, construction and operation of welding and cutting torches, definitions of various oxy-acetylene processes, basic weld joints. Demonstrations of oxy-acetylene welding and brazing using various types of filler alloys. Practical exercises in fusion welding of mild steel in the flat position using oxy-acetylene equipment.

WELD 146/Welding
Personal safety precautions, welding terminology, care and use of arc welding equipment, explanation of alternating and direct welding current, polarity, arc blow, shielding arc electrodes and metal transfer, electrode classification and color codes, factors governing the selection and use of electrodes, weld faults, testing of welds, causes and control of distortion. Demonstrations of electric arc welding and inert gas welding (TIG). Practical arc welding of fillets in the flat and horizontal positions with stringer bead and weave techniques using rutile type electrodes.

MACH 21/Toolmaking

Lathe: Formulas for sharp "V", American National Form, Unified National Form, Acme, Square threads. Taper turning and formulas. Tracer turning theory.
Mills: Attachments used on mills, types of cutters, cutter speeds and feeds, factors governing speeds and feeds. Use of coolants. Indexing, review repid, plain and simple indexing. Angular and differential indexing theory, toolmaking applications. Rotary table work. Gear cutting formulas, methods of cutting gears, checking gears, types of gears and applications. Use of pantography, tracer mills, and their toolmaking applications.
Grinding: Cylindrical grinding, review grinding wheel markings, manufacture of grinding wheels, methods of dressing, grinding faults.
Heat Treat: Purpose of heat treat. Methods of heat treat: cyaniding, carburizing, oil hardening, water hardening, air hardening, flame hardening, induction hardening, nitriding, sub-zero treatment, salt baths, hardening temperatures, quenching temperatures and media. Types of furnaces, checking hardness. Theory of pyrometers and thermocouples. Selection of steels.
Presses: types of presses, single action and double action. Power, press speed and pressure. Press accessories; die cushions, pneumatic and hydraulic. Feeders: hitch, roll, slide. Press specifications: shut height, stroke, tonnage. Press operation and safety.

MACH 30/Machine Shop

Mills: differential, angular and linear indexing. Terminology of spur gearing and problem solving. Helical milling.
Grinding: principal parts and operating procedures of cylindrical, cutter and surface grinders. Lapping, materials and abrasives. Micro-finishes and methods of checking.
Metallurgy: review of heat treat methods. Manufacture of steel. Effects of alloying elements.
Electrical Discharge Machines: parts and operating procedures. Manufacture of electrodes. Work holding devices. Dielectrics and systems of irrigation. The parts and operating procedures of the pantograph.

MACH 31/Toolmaking

Diemaking: Cutting dies; blank, pierce, shave, compound, cut-off, progressive trimming. Shaping dies: draw, form, bend, curl, bulge. Calculations; bend allowance, blanking pressure, stripping pressure, press tonnage, cutting clearance, and scrap strip. Stripping methods; urethane, rubber, spring, positive. Shear on punches and die blocks. Staggering punches. Application of clearance. Review basic die terminology. Blank sizes for drawing operations. Press brake dies and set-ups, press brake patterns. Spot welding dies. Steel rule dies, forging dies. Moulds: plastic and diecasting.
Electrical discharge machining: purpose and methods. Electrodes: manufacture and design materials. Dielectric fluids, erosion factors. Typical applications, work set-ups, finish.

MACH 110/Workshop Technology

The care and use of hand tools for metal removal, marking out and measuring. Lathe, shaper, mill and grinding machines. Precision measuring instruments, heat treatment, hardening. Projects involving benchwork, drilling, turning, milling, shaping and grinding.

MACH 120/Jig and Fixtures I

Layout procedures, fitting, fastener application, part planning, jig and fixture parts.

MACH 121/Jig and Fixtures II

Milling, welding, grinding and assembly fixtures, drill jigs.

MACH 122/Gauges

Plug and ring gauges, gap gauges, and special gauges.

MACH 123/Diemaking

Die parts and functions. Types of press tools. Die clearances.

MACH 124/Machine Shop

Fitting: filing, chipping, sawing, scraping, marking off, drilling, grinding. Introduction to lathe, parallel work, shouldering, parting, sharpening of lathe tools and drills, centre work. Theory.

MACH 125/Machine Shop

Screw cutting, chasing (flat surfaces), production of UNF, metric and special threads. Shaping machine, grinding, eccentrism and cranks. Theory.

MACH 130/Workshop Technology

Machining practices: milling, turning, boring, shaping, drilling. Marking out: layout for machining operation. Fitting: application of hand tools, bench work.

MACH 137/Small Tools and Measurement

The use and care of hand tools such as files, wrenches and screw pitch gauges. The application and care of precision instruments including micrometers, vernier calipers, gauge blocks, plug and ring gauges and dial indicators.

MACH 138/Lathe and Ancillary Equipment

Centre, tracer and turret lathe operation and theory including set-ups, tools, speeds and feeds, and lubricants.

MACH 140/Benchwork

The use and care of hand tools such as hammers, files, hacksaws and scribers, the application and care of precision instruments including micrometers, vernier calipers and indicators. Fasteners and their applications. General construction and operation of the drill press and bandsaw, safety precautions, methods of holding work on a drill press, drill sharpening, selection and welding of bandsaw blades, filing band. Basic heat treatment, furnaces, quenching.

MACH 141/Lathework

Components, operating and setting-up, safety precautions, plain and taper turning, drilling, boring and threading, sharpening tool bits, tracer lathe, turret lathe.

MACH 142/Milling and Shaping
Milling machine: construction, function and operation of various types of milling machine, workholding, cutters and attachments, speeds and feeds, dividing head; plain rapid and differential indexing, cutting compounds.
Shaper: principal parts and operation, machining surfaces and keyways with special attention to methods of holding work, safety precautions.
Electrical discharge machine: Purpose and methods, electrode manufacture and design; dielectric fluids, erosion factors; typical applications, work set-up, finish.

MACH 143/Grinding
Surface grinder: construction and operation, mounting wheels, methods of holding work, magnetic chuck, demagnetizing, grinding work square, safety precautions. Cylindrical grinder: principal parts and operation, internal and external grinding, workholding, sharpening milling cutters, safety precautions.

MACH 144/Machine Shop
Measurement: calipers, micrometer, checking concentricity and alignment, gearing tolerances. Operation of lathe, drill press, band saw hydraulic press. Use and care of drills, dies, taps, reamers, files. Plain and taper turning, boring, threading, drilling, hand reaming and pressing. Identifying and machining common metals.

MACH 201/Manufacturing Processes
A study of the factors which determine the selection of manufacturing processes. Casting processes; sand, permanent mould, injection. The forging process. Hot working and cold working, adhesives, powdered metallurgy. Plastics, thermoplastic and thermoset: materials, fundamental characteristics, principles of main processes, design considerations, selection of materials, production methods and techniques. Welding: welding processes and their applications to product design, production techniques, and materials. Heat treatment of steels. Production machine tools. Automatic machine tools used for thread cutting, gear and cam production, computer control of machine tools. Sheet metal and heavy plate fabrication. Design and cost factors of production. Inspection and quality control. Assembly and testing. Visits to manufacturing plants and industrial organizations will form a comprehensive part of this course.

MACH 203/Special Machine Techniques
Engraving, jig boring, jig grinding, slotting, tool and cutter grinding, turret and tracer lathe, electrical discharge machine, 3 dimensional milling, electro-chemical and ultrasonic machining, high energy forming, spinning.

MACH 204/Diemaking I
Punch press theory and operation, press brake theory and operation. Theory, development, construction and operation of the following types of dies: cut-off, trim, pierce, bending, blank, forming, compound.

MACH 205/Diemaking II
Theory, development, construction and operation of the following types of dies: progressive, draw, shaving, lancing, coining and embossing.

MACH 206/Diemaking III
Theory, development, construction and operation of most of the following dies: cold forming, bulging, swaging, broaching, assembly, sub-press, extruding, curling, side cam, horn, moulds (plastic and die cast), vacuum forming.

MACH 207/Diemaking
Press tool set ups and experiments. Safety construction, operation and maintenance of press tools.

MACH 208 (NC100)/Numerical Control
Definitions, history of machine tools, advantages and applications of NC, axis, absolute and incremental systems, point to point and continuous path systems, programming, tooling tape preparation, binary systems.

MACH 221/Machine Shop
Square threads, face plate work, milling and boring in the lathe, use of steadies, saddle boring, fly cutting. Theory.

MACH 222/Machine Shop
Milling and grinding, plain and vertical, slide milling, surface grinding. Heat treatment, hardness testing.

MARINE NAVIGATION TECHNOLOGY

MAR 100/Ship Knowledge
Ship recognition, division of vessels, shipboard organization, communication on board a vessel, tonnage and draught marks, fibre rope, whippings, hitches and knots, splicing, small line, small line calculations, synthetic rope, wire rope, splicing wire rope, wire rope calculations, tackles, tackle calculations, safety equipment, life-rafts, life-packets, fire and fire equipment, breathing apparatus, the hand lead, the ship's log, rules of the road, communication.

MAR 101/Magnetism
The magnetic compass, types of magnet compasses, terrestrial magnetism, magnets, temporary magnets, permanent magnets, calculations, how a ship is magnetized, deviation journals.

MAR 102/Chart Projection
The earth, units of measurement, chart projection problems, types of charts, chart information, chart usage, bridge navigation, soundings.

MAR 105/Meteorology
The atmosphere, temperature, water vapour, clouds, classification of clouds, instruments.
Meteorological Phenomena: Hydrometeors, other phenomena, wind, isobars, air masses and fronts, sea and swell, weather codes.

MAR 111/Ship Construction
Types of ship, construction details, structure, cargo accommodation, engines spaces. Piping systems, methods of launching.

MAR 200/Naval Architecture
How a vessel is constructed, the mould loft, the scrieve board, construction and fabrication, launching trials, classification, Lloyd's dimensions, the girder theory, connections, transverse section of a modern cargo vessel, shell plating, longitudinal section of a modern cargo vessel, hydrostatics and ship's stability, ship dimensions, stability, virtual centre of gravity, statical stability curves, dynamical stability.

MAR 201/Seamanship
The anchor windlass, anchors, anchor chain, anchor work, the capstan, winches, cargo handling equipment, calculations of cargo handling equipment, handling cargo with more than one derrick, calculations of handling cargo with more than one derrick, sheer legs, calculations of sheer legs, the Canadian Tackle Regulations, fire detection and extinguishing regulations, fire fighting on board, the Life Saving Equipment Regulations, the Portable Water Regulations, steering equipment, the Canadian buoyage system, the uniform buoyage system, rules of the road, communication.

MAR 202/Ship's Business
Building and naming a vessel, records kept on board a vessel, documents carried on board a vessel, documents pertaining to cargo, owner's responsibilities to the seaman, seaman's responsibilities to the owner, customs and immigration, collision, pilotage.

MAR 203/Navigation
The earth, the celestial sphere, the solar system, time, the sextant, celestial navigation, position lines.

MAR 300/Naval Architecture
Mid-line longitudinal bulkheads, general arrangements in machinery and boiler spaces, superstructures and deckhouses, deck fittings, ventilation, ballast arrangements, types of cargo ship construction, modern oil tankers, strengthening for navigation, rudders and turning, arrangements about the stern of a vessel, stability, virtual centre of gravity.

MAR 301/Seamanship
Ballast and ballast arrangements.
Cargo and cargo work: General cargo, grain cargo, coal cargo, ore cargo, liquid cargo, ventilation of cargo, timber cargo, rice cargo, fruit, meat, dangerous cargo, separation of cargo, spar ceiling, loading with electro-magnets, damage to vessel incurred while loading and discharging, the scrap log, the cargo book, calculations, oil pollution, disposal of nuclear waste.

MAR 302/Tidal Theory
Tidal definitions, causation of tides, the equilibrium theory, gravitational effects of moon and sun, the effect of declination, prediction of tides at principal and secondary ports. Admiralty methods of tidal prediction.

MAR 303/Navigation
Marc St. 'Hilaire method of position finding, usage of planets and stars, star identification, latitude by Polaris, prime vertical and meridian altitude positions, position lines, chart work, Decca systems, long-range DF.

MAR 304/Meteorology
Temperature, pressure, air circulation, principal air masses and frontal zones, climate, ocean currents, rainfall, climate in tropical belts, sub-tropical climate, local weather, weather map forecasting.

MAR 306/Magnetism
Vessel's magnetic field, permanent magnetism in a vessel, induced magnetism, permanent "B" and induced "b", heeling error, vibrating needle, methods of compass adjustment.

MAR 307/Chart Projection
Chart usage, transit bearings, lights, station pointer, use of radar in chartwork, position lines, radio bearings, special charts.

MAR 308/Engineering Knowledge
Marine boilers, scotch boilers, watertube boilers, auxiliary boilers, boiler fittings, their function and operation. The properties of steam, corrosion and upkeep. Fuels, engines, turbines, internal combustion engines, the hot bulb engine, types of pumps, refrigeration, steering gears, shaft and propeller arrangements.

MAR 400/Naval Architecture
Riveting versus welding, strength of materials, properties of metals, modern types of construction, variable pitch propellers, stability, drydocking, density, bulkheads, reports, the Ralston trim indicator.

MAR 401/Seamanship
Manoeuvring, towing, emergency towing, emergency safety operations, emergency manoeuvring, rescue at sea, accidental stranding, jury rudders, relieving tackle, collision, drydocking, abandoning ship, assistance from aircraft, assistance from the shore, metals and maintenance, mate's work record book, rules of the road, communication.

MAR 403/Navigation
The fourth year will be spent in preparation for writing the DOT examinations, special attention being given to comparison of methods of sight reduction, methods of navigation applicable to high latitude sailing, consideration of future methods of navigation, doppler as used in aircraft navigation, possibility of inertial and satellite navigation. Star identification, location of stars suitable for navigational purposes, usage of star charts, identification of stars by means of Azimuth tables, time of stars' meridian passage, location of stars on or near the meridian, location of the planets. In addition, problems will be directed to prepare the student for his Knowledge of Principles paper.

MAR 404/Chart Projection
Practical chartwork, problems involving fixes, set and drift, current laying off, counteracting courses for current, problems involving leeway, finding the set and drift when a vessel is steering a course to counteract an estimated current, horizontal angle problems, vertical angle problems, three bearing problems, position line usage, celestial and terrestrial, DF bearings, line of soundings, usage of Decca, Loran and Consol overlay charts. Advantage of wind and current usage, consideration of prevailing wind and currents in making passages.

The above courses form a program leading to certification as Marine Navigation Officer. See M2.

MARKETING

MARK 100/Marketing
To provide the student with basic comprehension of marketing theory in the following major areas: (1) the Organization; its composition, functions, and structure; (3) the Consumer; defining the Consumer, his buying habits and motives; (3) Marketing; matching the Organization goals with Consumer goals, distribution, product, and pricing.

MARK 101/Salesmanship
The study of the basic knowledge and skills required by the effective salesman with emphasis on the following broad topics: (1) knowing your customer, (2) knowing your principal, (3) administering your own work, (4) the interview, (5) business ethics and etiquette.

MARK 102/Marketing and the Consumer
The new Marketing concept focuses attention on the consumer. Who and where is he? Why and how does he buy, and accordingly can he be reached and measured? Does he represent a Market? The social and economic effects of advertising, government and industry controls of advertising, and the influence of advertising on the consumer will be studied. Case studies will form a part of this course.

MARK 104/Advertising and Sales Promotion
The following topics will be covered: types of advertising, advertising media, standards, the Agency: the advertising department, functions, co-ordination, sales promotion, methods of affecting selling; organizing of the advertising and sales promotion department; emphasis on case studies.

MARK 200/Marketing and the Organization
How does the organization allocate its resources to meet the consumer's needs and wants profitably?
Topics include: organization structure, planning, products, pricing, forecasting and Market Research; equal time will be spent on Advertising as used in the marketing mix. Attention will centre on the media, its use and importance in the market; the media mix as used in developing the Media Plan.

MARK 201/Sales
Why employ salesmen? The importance of direct sales to business.
Topics include: the use of a sales force, how the salesman sells, principles of good sales techniques, sales planning and communications theory.

MARK 202/Marketing and the Distribution Channels
Part A: How are the goods and services directed to the consumer? A study of retailers, wholesalers, jobbers, agents, warehousing, transportation and inventory; marketing controls and sales analysis. Emphasis will be on case studies.
Part B: Advertising: will emphasize the creativity of advertising copy, art and layout, print, radio and television as well as the principles of advertising production. Case problems will play a major role in the course.

MASONRY

MAS 10/Masonry I
Introduction to the craft, tools and equipment, mortar mixing equipment, trade terminology, principles of bonding, introduction to shaped cuts, purpose made units, joints in brick and stone work, safety precautions, scaffolding, types of walls, efflorescence, green stain and its treatment, footings and foundations, technical workshop drawing, pilasters, buttresses, piers and columns, mortars, sands, limes, cements, manufacture of structural clay products.

MAS 20/Masonry II
Introduction to the course, power tools in the industry, time and motion study, placement organization, problems in bonding layout of patternwork, arches, workshop geometry, single and double attached piers, acute and obtuse angles, revels and rebates, radius junctions, tee junctions, modular co-ordination, safety and scaffolding, shoring-dead, raking, horizontal underpinning, mortar types, manufacture of portland cement, concrete masonry units, SCR units.

MAS 30/Masonry III
Estimating brick and mortar, modular and non-modular, workshop geometry, rat-trap bonds, Gilbreth patterns, advanced bonding in straight lengths. Reinforced grouted brick masonry, dampproofing and waterproofing site lay-out transit, fireplaces, circular work, refractories, adhesives, insulating materials, grouts, concrete, fireclays.

MATERIALS SCIENCE (New Section)

MAT 100/Metallurgy
Atomic theory of metals; metallic states, grain formation and growth, metal deformation, mechanical properties, heat treatment of metals. Iron and steel: iron-carbon equilibrium diagrams, types, properties and uses of cast iron, production, types, properties of steel. Production, properties and uses of non-ferrous metals: aluminum and its alloys, copper and its alloys, magnesium and its alloys, nickel and its alloys, lead and its alloys.

MAT 200/Plastics
Fundamentals and characterisation of polymers, introduction to the chemistry, properties and end uses of basic resins, engineering thermoplastics; natural polymers; polyesters; epoxies, reinforcements and fillers; fluorine polymers; the neew plastics; elastomers; phenolics; silicones; furanes. Identification by simple tests. Material and product testing.

MATHEMATICS

MATH 10/Mathematics
Arithmetic operations: fractions, decimals, percent. Weights and measures: units of linear, square and cubic measure. Right triangle relationships. Application to shop calculations.

MATH 11/Mathematics
Arithmetic: whole numbers, fractions, decimals. Weights and measures: units of weight, units of capacity, quantity estimating, elements of costing and estimating. Percentage: methods of calculations, profit and loss, trade discounts, simple interest, calculation of taxes. Introduction to bookkeeping: the work sheet, specified journals, financial statements.

MATH 12/Mathematics
Algebra: fundamental operations, linear equations, formula, factoring, fractional equations, laws of exponents, simultaneous equations, quadratics.

MATH 13/Mathematics
Business mathematics: fundamental operations, interest, trade discounts. Basic bookkeeping: the balance sheet, classified financial statements, specified journals. Business practice: retailing, contracts and credits, insurance, banking and interest, taxes, licensing and lease, causes of business failure, forms of organization, promotion plan and policies.
One Semester

MATH 16/Mathematics
Arithmetic: operations with whole numbers, fractions, decimals, per cent, and ratio and proportion. Units of linear, square and cubic measure. Weights and measure. Weights and measures, quantity estimating. Pythagorean triangles and relationships. Slide rule.

MATH 20/Mathematics
Review as necessary all principles, operations and formulae from Term I. Mensuration: area calculations of plane figures, calculation of volume and capacity. Ratio and proportion. Algebra: fundamental operations, solution of linear equations and formulae required in shop calculations.

MATH 21/Mathematics
Arithmetic operations: whole numbers, fractions, decimals, percentage. Estimating: units, trade unit, conversion-calculation of quantity, principles of costing, the inventory. Business practice: calculation-payroll and wages, insurance, taxes, workmen's compensation, wage earner's lien. Elements of bookkeeping.

MATH 22/Mathematics
Review: geometry of plane figures. Review as necessary all principles, operations and formulae from Term 1. Geometry: angular measure, definitions and terminology, properties of triangles, properties of the circle. Computation: calculations with logarithms, calculations with slide rule.

MATH 23/Mathematics
Arithmetic, weights and measures; making change; decimals, percent, discounts, interest, cost price, selling price, mark-up, overhead, profit and loss, depreciation, bank accounts, deposit slips.

MATH 30/Mathematics
Review as necessary all principles, operations and formulae from Term II. Algebra: exponent laws, solution of equations, manipulation of formulae. Trigonometry: solution of rightangled triangles, the oblique triangle. Practical applications of operations and formulae required in calculations of the trade.

MATH 32/Mathematics
Review as necessary all principles, operations and formulae from Term I and II. Trigonometry: trigonometric functions, solution of the right triangle, problems in surveying involving the right triangle, solution of oblique triangles, sine law, cosine law, calculations in stress and structure, problems.

MATH 100/Mathematics
Semester *I:* Computations with measured quantities, metric and English system. Algebra: linear equations, simultaneous equations, quadratic equations, higher degree equations. Logarithms, trigonometry: right triangle.

Semester *II:* Trigonometry: oblique triangle, compounded and multiple angles, sum and product formula for angles, properties of triangles and circles, functional concept and functional notations, introduction to series, introduction to analytical geometry, introduction to differential calculus.

MATH 102/Mathematics
Algebra: Signs symbols, fractions, fractions used in mathematics, terms used in mathematics, evolution, involutions, base, index, coefficients, etc., addition, subtraction, brackets, use of brackets, brackets preceded by a number, substitution, multiplication and involution, division and evolution, ratio and proportion, progressions, numerical and geometrical, simultaneous equations, quadratic equations.
Geometry: How to bisect an angle, to bisect a straight line, to draw a straight line perpendicular to a given straight line from a point in the line, to draw a straight line perpendicular to a straight line from a given point external to the line, to divide a straight line into any number of equal given parts. Triangles, method of construction from given data, construction of quadrilaterals from given data, how to draw parallelograms, squares and rectangles, to draw a circle through any three given points, to describe a circle about a triangle, to inscribe a circle inside a triangle, to draw a tangent to a given circle (a) from a given external point, (b) from a given point on the circumference to draw a common tangent to two circles, on a given straight line to draw a segment of a circle which will contain a given angle. Pythagoras theorem, summary of the properties of triangles, parallel lines, circles, basic theorems, examples of the usage of geometry in navigation.
Vector Geometry: Definition of a vector, fundamental properties, linear combinations, auxiliary point technique, addition of vectors, subtraction of vectors, multiplication of vectors by scalars, rectangular systems and orientation, basis vectors and application, the complex plane, inner products, properties of inner products, components, inner product formula work.
Trigonometry: Standard position of an angle, sexagesimal measure, radian measure, relationship between sexagesimal and radian measure, expressing an angle as a decimal of a right angle, converting radian and sexagesimal measure, ratios of an acute angle, ratios of special angles, use of the natural function tables, logarithms, their usage, conversion of logarithms from the base 10 to other bases, ratios of any angle, expansion formula for compound and multiple angles, transformation formula, solution of oblique triangles, properties of triangles and polygons, trigonometric equations, inverse notation, arcs of circles and angular velocity.

MATH 103/Mathematics
Common logarithms, standard notation, volumes and surface of solids, formulae, manipulation, percentages; ratio, proportion Simpson's rules; factorization, variation, simultaneous equations; theory of indices, naperian logarithms; radian measure, trigonometry.
One Semester

MATH 104/Mathematics
Graphical work: sin, cos, tan, ± 360° sin (wt + x). Straight line; simultaneous linear equations; determination of laws of linear form; geometry; congruent and similar triangle; Pythagoras, intersections, areas, segments of circle, ellipse and parabola.
One Semester

MATH 107/Technical Mathematics
Semester *I:* Technical Mathematics. Review: square root, right angle triangle, fundamental algebraic equations. Review as necessary all principles, operations and formulae. Formulae: literal equations, practical applications. Ratio and proportion: direct and inverse ratios, direct and inverse proportions, practical applications.

Semester *II:* Algebra: exponent laws, standard numbers, linear equations, radical equations, solution of formula, simultaneous equations, graphs, logarithms.

MATH 110/Mathematics
Mathematics for industry: arithmetic processes, operations with whole numbers, fractions, decimals, square root. Percentages: simple and compound interest, trade discounts, food costs. Mensuration: weights and measures, volumetric measures, metric system. Ratio and proportion. Graphic representation. Increasing and decreasing quantities in recipes. Calculating portion costs and selling prices. Calculating portion sizes and amounts to purchase. Yield tests.
One Semester

MATH 113/Business Mathematics
Semester *I:* Discounts: markups, margin, markdowns. Interest: present value, discounting negotiable instruments, partial payments. Installment purchases: true interest rate on installment purchases. Methods of computation.

Semester *II:* Shares, depreciation, payrolls, commission, insurance, property taxes. Funds: sinking funds, annuities, mortgages, amortization. Methods of computation.

MATH 114/Business Mathematics
Fundamental arithmetic operations: fractions and percentage, rapid calculation, computing with calculators. Interest calculations: simple interest, compound interest, interest rates. Business calculations: insurance, banking and interest, taxes, discounts.
One Semester

MATH 115/Mathematics of Finance
Interest calculation of simple interest, compound interest and discount. Variables and graphs. Linear functions, exponential functions, logarithms. Representation of data: rounding of data, scientific notation, line graphs, bar graphs, pie graph. Introduction to statistics: the histogram, the frequency polygon, frequency curves.
One Semester

MATH 116/Business Mathematics
Number systems and number representation: radix, positional values, conversion methods. Binary arithmetic: fundamental operations. Fixed-point and floating-point arithmetic. Numerical codes. Algebra: the function concept, the linear function, systems of equations, elements of linear programming. Mathematical and non-mathematical iterative processes.
One Semester

MATH 130/Mathematics
Semester *I:* Arithmetic processes: fractions, decimals, square roots. Logarithms: fundamental operation. Slide rule: fundamental operations. Practical geometry: properties of triangles, circle. Areas: measurement of plane figures, the S formula. Volume: units of volume and capacity, the right prism, the cone and pyramid, the sphere and solid ring. Algebra: fundamental processes, indices, theory of logarithms, linear equations, simultaneous equations, quadratic equations, quadratic surds.

Semester *II:* Ratio and proportion: direct and inverse ratios, direct and inverse proportion, similar and contingent figures, variation, application to practical calculations. Trigonometry: angle measure, functions of acute angles, the reciprocal ratios, the co-functions, solution of the right triangle, application of the slide rule, application of logarithms, functions of any angle, solution of the oblique triangle, sine and cosine laws, area of triangles, application to practical problems.

MATH 131/Mathematics
Semester *I:* Arithmetic processes: fractions, decimals, square root. Powers of ten: the standard number, laws of indices, fundamental slide rule operations. Algebra: fundamental operations, linear equations, simultaneous equations applied to Kirchoff's Laws, quadratic equations, functional notation. Logarithms: fundamental operation, calculation of decibel and power ratios. Graphs: Cartesian co-ordinates, representation of functions. Trigonometry: angle measure, the degree, the radian, ratios of acute triangles, solution of right triangles.

Semester *II:* Impedance diagrams, graphs of sine and cosine functions, resolution of wave forms. Plane vectors: vector representation, vectors as complex numbers, polar quantities, conversion of rectangular and polar forms, fundamental of vector algebra, application to LCR Circuit Analysis. Slide rule: extension of slide operations, operations with complex numbers. trigonometric solutions of triangles.

MATH 132/Mathematics
Semester *I:* Arithmetic processes: fractions, decimals, square roots, applied geometry, properties of the right triangle; Pythagoras' theorem, the circle, area and circumference, sectors and segments. Volumetric measure: weights and measures, capacity of tanks and piping, calculation of rates of flow. Algebra: fundamental operation, equations, linear, simultaneous, quadratic, formula, manipulation, evaluation, indices, powers of ten, standard numbers, slide rule operations. Logarithms: fundamental operations, calculations involving trade formula.

Semester *II:* Trigonometry: ratios of any angle, solution of right triangles, oblique triangle, sine and cosine law, resolution and composition of vectors. Proportion: direct and inverse ratios, direct and inverse proportion, application to pulleys and gears, scale conversions. Units: English units, metric units, MKS system, CGS system, conversion factors and calculations.

MATH 133/Mathematics
Arithmetic processes: operations with whole numbers, fractions, decimals, use of scales, square root. Percentages: simple interest, loans and financing, trade discounts. Mensuration: weights and measures, area of plane figures, volumetric measure, units of capacity. Ratio and proportion: direct and inverse ratios, direct and inverse proportion. Applied geometry: geometrical constructions, right angle triangle, properties of plane figures. Fundamental algebra: fundamental operations, linear equations, shop formulae.
One Semester

MATH 134/Mathematics
Semester *I:* Arithmetic: whole numbers, fractions, decimals, square root. Percentage: simple interest, trade discounts. Mensuration: linear measure, area measure, geometry of plane figures. Pythagoras' theorem. Ratio and proportion: similar figures, scales and scale conversions.

Semester *II:* Business mathematics: basic bookkeeping, retailing, insurance and investments, taxes, licensing and leases, bankruptcy and insolvency.

MATH 135/Business Mathematics

Whole numbers: fundamental operations, addition and subtraction, multiplication and division. Fractions: addition and subtraction, multiplication and division by whole numbers. Decimals: addition and subtraction, multiplication and division by whole numbers, calculations involving dollars and cents. Percentage: calculation of percent, calculation of taxes involving percent, bill total and percent increase.
One Semester

MATH 136/Mathematics

Semester *I:* Review of basic processes: addition, subtraction, multiplication and division of integers, fractions and decimals ratio and proportion, percentage, powers and roots, measurement of area; volume and capacity. Algebra: algebraic notation, signed numbers, equations and formula.

Semester *II:* Geometry: properties of geometric figures, fundamental construction. Trigonometry: trigonometric ratios, solution of right-angled triangles, sine and cosine laws, solution of oblique triangles, use of logarithms and standard tables. Shop calculations.

MATH 142/Mathematics

Whole numbers: addition, subtraction, multiplication and division. Study of measures involving whole numbers. Fractions: addition, subtraction, multiplication and division. Units of measure. Decimal numbers: fundamental operations, conversion of decimals. Per cent: calculation of sales tax and simple interest. Area of plane figures.

MATH 143/Mathematics

Semester *III:* Number systems: whole numbers, common fractions, decimal fractions. Fundamental operations involving whole numbers, common fractions, decimal fractions, percentage. Units of measure.

Semester *IV:* Operations with decimals and fractions. Measurement: linear, square, cubic. Introduction to geometry. Percentage. Calculation of simple interest and commission.

MATH 146/Mathematics

Semester *I:* Algebra: signed numbers, fundamental operations, solution of equations. Basic geometry. Mensuration: calculation of areas and volumes. Methods of computation.

Semester *II:* Algebra: operations with binomials and trinomials. Graphs: graphs of algebraic functions. Mensuration: properties of triangles, properties of plane figures. Calculation of surface areas and volumes. Introduction to trigonometry.

MATH 147/Mathematics

Semester *I:* Manipulation of formulae. Introduction to graphs, linear functions. Methods of computations, logarithms, the slide rule. Mensuration, surface measurement, volume measurement. Systems of equations. Trigonometry, solution of triangles, application to practical problems.

Semester *II:* Algebraic operations. The quadratic function, application to practical problems. Trigonometry, computations involving the oblique triangle, properties of triangles. A combination of topics selected from the following options: Series, Geometry, Statistics, Introduction to Computer Principles, Analytic Geometry.

MATH 148/Business Mathematics

Semester *I:* Algebra, weights and measures, business graphs, averages, borrowing and buying on credit, markup, gross margin, trade discounts, commission and storage, insurance.

Semester *II:* Profit and loss, taxation, home ownership, income tax, excise tax, compound interest, annuities, stocks and bonds.

MATH 152/Business Mathematics

Semester *I:* Whole numbers, fractions, decimals, simple algebraic expressions and equations, signed numbers, percentage, simple interest, bank accounts, retail business.

Semester *II:* Practical measurements, ratio, proportion, interest, borrowing, retailing, commission, profit and loss, formulas.

MATH 156/Business Mathematics

Fundamental arithmetic operations. Method of computation. Percentage: calculation of simple interest, compound interest. Profit and loss, commission, storage, insurance, trade discounts. Manipulation of business formulas.
(One Semester)

MATH 200/Mathematics

Semester *I:* Analytic Geometry, differential calculus, differentiation, practical applications.

Semester *II:* Integration, the definite integral: areas under curves, volumes. Introduction to differential equations. Practical applications.

MATH 201/Mathematics

Binomial theorem, permutations and combinations. Quadratic equations. Exponential functions and rate of growth. Basic computer mathematics. Statistical analysis.

MATH 202/Spherical Trigonometry

The sphere, great and small circles, lune, spherical angles, spherical triangles, equality of triangles, concurrence of lines within the triangle, solution of spherical triangles, the sine formula, the cosine formula, the haversine formula, the four-parts formula, polar triangles, solution of right-angled and quadrantal triangles, Napier's rules, area of a line, spherical excess, terrestrial and celestial spheres, projection on the plane of the rational horizon, supplemental theorems, identities, Delambre's Analogies, Napier's Analogies, Legendre's theorem.

Introduction to Calculus: Binomial theorem, binomial expansion, the general term expansion of (1 plus X)n, Pascal's triangle of factors, expansion of (A plus X)n, solution of roots, negative and fractional indices, exponential series, origin of compound interest, law of organic growth, evaluation of epsilon, expansion of e^x and e^{-x}, graphs of exponential functions, exponential growth and decay Naperian logarithms. Differential Calculus. Variation of a function, gradients of curves, rate of change, slopes of linear and non-linear functions, tangents to curves, calculus notation, the meaning of differentiation, the differential coefficient, limits, the limit of a function, calculation of limits, differentiation from first principles, differentiation by rule, sum and difference quantities, products and quotients, successive derivatives, differentiation by substitution, function of a function, exponential and logarithmic, kinematics, trig. functions. Integral Calculus, the meaning of integration, integration as the reverse of differentiation, the indefinite integral, integration of algebraic expressions, constant of integration, evaluation of the constant, trigonometric exponential and logarithmic fractions, integration as a summation, the definite integral, integration between limits, area under the curves.

MATH 203/Mathematics

Calculus: Differentiation x^4 function of maximum and minimum; A and G series; binomial theorem, indices; vector addition complex numbers, De Moirves theorem.

MATH 204/Mathematics

Calculus: Slope of curves, points of inflexion. Differentiation of sum; product; quotient; integrations of ax^4 aa^x $aa^x + b$ sin $(ax + b)$.

MATH 207/Business and Bookkeeping

Semester *I: Business Mathematics*. Fundamental operations: Percent, interest, trade discounts, calculations of interest charges, bank drafts.

Semester *II: Bookkeeping*. The balance sheet, classified financial statements, specified journals.

MATH 210/Accounting

General Accounting for the industry: bookkeeping and accounting methods as used in food service operations.
One Semester

MATH 211/Accounting

Purpose, rules, terms used, daily, monthly record sheets, wage and petty cash records, cheques, statements, other records, profit and loss sheets, expenditures, summaries, operation of cash registers, handling money, introduction to cost control, business percentages, formula costing.
One Semester

MATH 214/Business Mathematics

Elements of matrix arithmetic. Sequences. Series and progressions. Boolean tables. Analysis of logical relations. Application to symbolic coding. Introduction to the theory of probability. Introduction to statistics: rounding off data, presentation of data. Forms of graphical representation: linegraphs, bar graphs, the histogram, the frequency polygon, the frequency curve.
One Semester

MATH 215/Statistics

The elements of statistics as applied to business. Treatment of numerical data: graphical representation, the analytic method. Frequency distributions, measures of central tendency and spread. Elementary probability theory. Introduction to time series and forecasting. Index numbers and their application.
One Semester

MATH 302/Mathematics

Differential Geometry*:* Elementary concepts, re-examination of the cartesian system, graphs, concept of ordered pairs, of numbers, functions, concept of projection on a straight line, directed line segments, length of line segments.
Loci and their equations, identification of algebraic and geometric forms, straight line, circle, ellipse, hyperbola, parabola, conic sections, polar co-ordinates, parametric equations, loci in three dimensional space, thoughts on space. Euclid's common-sense space, Rieman's unconventional space.

Calculus: Binomial Theorem, negative and fractional indices, compound binomial expressions, product of binomials.
Exponential Series: Exponential equations, transfer of base, solution of series, compound exponential expression, hyperbolic functions.

Differential calculus: Rates of change, maxima and minima, application to areas and volumes, trigonometric functions, compound and multiple angles, hyperbolic functions, applications of calculus, partial differentiation, implicit functions, differential equations.

Integral calculus: Integration by substitution, areas under curves, volumes generated by the rotation of curves, mensuration, proof of formulae, centroids and centres of gravity, Pappus theorem, Guldin's theorem, moments of inertia, moments of area, moments of volume.

MATH 303/Mathematics

Integration by substitution, by parts, definite and indefinite fractions, partial fractions. Applications of calculus; bending beams, power, rates of change, velocity, acceleration.
One Semester

MATH 304/Mathematics

Integration, areas under curves, moments of inertia, of volume, of area, volumes of revolution, parallel axis, centres of pressure, centres of gravity; RMS values. Co-ordinate geometry: equations of straight lines, parabola, hyberbola, tangent, normal, parameters.
One Semester

MATH 306/Mathematics
The definite integral: the multiple integral–applications. Partial differentiation, differential equations of the first and second order. Series: MacLaurin and Taylor series, Fourier series. Boolean algebra: numbering systems and basic operations, basic theorems and truth tables, application of Boolean techniques to circuit analysis and design.

MATH 307/Mathematics
Numerical methods and digital computations: roots of equations, methods of approximation. Case studies of digital computer numerical methods. Statistics: terms and definitions, frequency distributions, measures of central tendency and dispersion, probability concepts, theoretical distributions, sampling distributions, sampling, reliability and estimation.

MATH 316/Elementary Statistics
An introduction to statistics: organization and presentation of data measures of central tendency; dispersion; frequency distribution; sampling; confidence limits; hypothesis testing; regression analysis; experimental design.

MATH 402/Mathematics
A review where applicable for the preparation for writing the DOT examinations. Practical application of Mathematics, the derivation of the various mathematical tables, Burdwood's Azimuth Tables, Davie's Star Tables, The Altitude-Azimuth Tables, duration of daylight and darkness, time of sunrise and sunset, time of moonrise and moonset, time, location and altitude of various stars used for navigational purposes, errors involved in calculations.

Great circle sailing. Initial course, final course, distance, latitude and longitude of the vertex, points, along the course, their latitude and longitude, finding the course and distance by usage of the ABC tables.

Composite great circle sailing. Calculations involved in the usage of composite great circle sailing.

MEAT CUTTING AND BUTCHERY

MC 10/Theory of Meat
Inspection, grading, types and composition of meat. Characteristics, grades and wholesale cuts of beef, pork, lamb and veal. Classes, grades and characteristics of poultry. Types and characteristics of seafood available on the Canadian market.

MC 11/Practical Meat Cutting
Breakdown of lamb, veal, pork and beef from wholesale to primal, to usable size portions. Cleaning and boning of poultry. Cleaning and filleting of fish.

MC 12/Practical Meat Cutting
Trade accepted methods of cutting beef, veal, lamb, and pork for retail service and self service stores. Cleaning, cutting and displaying of poultry products for sale. Cleaning and processing of fish products for retail sale.

MC 13/Trade Theory
Introduction and proper use of all personal and electrical equipment found in a meat department. Theory relating to the cutting of beef, lamb, veal, pork, poultry and fish products. Meat inspection, grading, weights and measures act and food and drug act pertaining to the meat industry.

MC 20/Meat Cutting
Advance cutting of specialty cuts, preparation of crown roasts, gallantines and gourmet meat products. Portion cutting of beef, lamb, pork and veal for hotel and restaurant use.

MC 21/Theory of Meat
Review of basic subject material. Cured and smoked product terminology. Detail data on curing, smoking and processing of meat products. Cost control of meat products through cutting tests and portion control. Food and Drug Act as it pertains to meat products. Buying of meat products–cost versus quality.

MC 130/Theory of Meat
Inspection, grading, types and composition of meat. Characteristics, grades and wholesale cuts of beef, pork, lamb and veal. Classes, grades and characteristics of poultry. Types and characteristics of seafood available on the Canadian market.

MC 131/Practical Meat Cutting
Breakdown of lamb, pork, veal, and beef from wholesale to primal, to usable size portions. Cleaning and boning of poultry. Cleaning and filleting of fish.

MC 132/Practical Meat Cutting
Breakdown of lamb, pork, veal and beef from wholesale to primal, to usable size portions. Cleaning and boning of poultry. Cleaning and filleting of fish.

MC 133/Practical Meat Cutting
Trade accepted methods of cutting beef, veal, lamb, and pork for retail service and self service stores. Cleaning, cutting and displaying of poultry products for sale. Cleaning and processing of fish products for retail sale.

MC 134/Trade Theory
Introduction and proper use of all personal and electrical equipment found in a meat department. Theory relating to the cutting of beef, lamb, veal, pork, poultry and fish products. Meat inspection, grading, weights and measures act and food and drug act pertaining to the meat industry.

MECHANICS

MECH 100/Mechanics
Semester *I:* Statics: force systems, concurrent co-planar force systems, resultants of force systems, forces in equilibrium, forces in structures, method of sections, centres of gravity and centroids, moment of inertia of static bodies. Work energy and power.

Semester *II:* Machines: dynamics: velocity and acceleration, displacement, sign convention, laws of motion, Galileo's equations, inertia force, angular displacement velocity, acceleration units, radius of gyration, work, energy, and power, impulse momentum impact.

MECH 102/Mechanics
Semester *I:* Forces, concurrent and concurrent coplanar. Forces–friction. Centroids and centres of gravity.

Semester *II:* Dynamics: velocity and acceleration, displacement, sign convention, Galileo's equations, motion due to gravity, angular motion, impulse, impact, momentum.

MECH 110/Mechanics of Materials
Semester *I:* Statics review: forces in structures, stress and deformation, stress and strain. Young's Modulus of elasticity. Riveted and welded joints, torsion.

Semester *II:* Centroids, moment of inertia. Beams, stresses in beams, deflection of simple beams, thick and thin wall cylinders, combined stresses. Point and distributed loadings, columns.

MECH 115/Mechanics of Fluids
Semester *I:* Properties of fluids: capillarity, viscosity, surface tension, etc. Hydrostatic force and pressure. Centre of pressure. Buoyancy and floatation.

Semester *II:* Fundamentals of fluid flow–Benoulli's theorem, continuity, orifices, nozzles and weirs. Fluid flow in pipes–Moody chart. Fundamental principles of hydrodynamics. Dimensional analysis.

MECH 210/Mechanics of Materials
Semester *I:* Advanced calculations and diagrams: loading, shear forces and bending moments for simply supported beams, cantilevers and continuous beams, reinforced concrete design, typical slabs, columns, beams, foundations, stairs, cantilevers, retaining walls, structural steel design, standard sections and their characteristics, use of tables.

Semester *II:* Selection of sections, beams, stanchions, columns, plate girders, riveted, bolted and welded connections, steel roof truss design, details of joints.

MEDICAL

MED 100/Introductory Anatomy and Biomechanics
The functional anatomy of the human body including the skeletal structure (osteology), the muscle systems (myology), the blood circulation system (angiology), the nervous system (neurology) and the functions of digestion, respiration and excretion.
Basic anthropometric data, physical properties of tissues, analysis of forces acting on the skeletal structures and torques developed around body joints.

MED 200/Intermediate Anatomy
The functional anatomy of the human body including study of the anatomical joints in relation to prosthetic hardware. Pathological studies of the skeletal structures including indications for amputation.

MED 201/Introductory Physiology
Skin disorders and cell structure. Blood, its composition and functions.
The functional muscular system, circulatory and respiratory.

MED 202/Introductory Pathology
Diseases of the body including degenerative erosion of the joints. Methods of treatment in relation to external and internal prostheses. Cardio-vascular system.

MED 300/Advanced Anatomy and Kinesiology
Prosthetic-orthotic design in relationship with body conformation, skeletal and musculature contours. Maintenance of high standard of fitting practices in static and dynamic alignment. Electrical diagnosis, check-out, and finalization of prosthetic/orthotic components.

MED 301/Physiology
Systems of the body co-related with other courses. The effects of amputation on nervous, arterial, veinous, circulatory and respiratory systems. Surgical techniques. Atrophy and hypertrophy.

MED 302/Pathology
Bone and cellular structure, weight bearing areas. Diseases and their effects. Pain, symptoms, causes and indications for surgery. Blood supply, protein, living and dead cellular structures, skin.

METALLURGY

MET 100/Metallurgy
Atomic theory of metals: metallic states, grain formation and growth, metal deformation, mechanical properties, heat treatment of metals. Iron and steel: iron-carbon equilibrium diagram, types, properties and uses of cast iron, production, types, properties and uses of steel. Production, properties and uses of non-ferrous metals: aluminum and its alloys, copper and its alloys, magnesium and its alloys, nickel and its alloys, lead and its alloys.

MET 109/Metallurgy
Materials used in the construction of marine boilers and engines. Sources of various metals. Production methods of steel and iron. Castings. Steel and iron process. Steel and iron treatment. Various types of steel and iron. Steel alloys. Strength and composition of steel, iron and steel alloys. Properties of various ferrous metals. Testing.

MET 110/Metallurgy
Non-ferrous metals: sources and manufacturing methods, properties, treatments. Various alloys and their composition and properties. Strength and testing.

MET 130/Metallurgy I
An introduction to the base metals commonly used in the watch-making and jewellery trades. A more complete coverage in the precious or "noble" metals, namely the mining, refining and preparation from the raw ores to the finished metals as used by the craftsmen.
An introduction also to the acids and liquids commonly used in cleaning, soldering, etc., in each of these affiliated trades.

MET 131/Metallurgy II
An introduction to the methods of testing yellow and white metals to enable the craftsman to buy old precious metals with the accuracy required to make a profit. A more complete coverage of the precious metals which the jeweller as well as the watchmaker buys, sells or repairs in his normal daily operations.

MET 132/Metallurgy
Iron, steel, wrought iron, cast iron, alloy constitution, diagrams, iron Fe 3 C System, heat treatment, physical metallurgy, alloy steels, physical testing, non-ferrous metals.

MET 300/Metallurgy
Structure and states of metals and compounds. Physical and mechanical properties of metals. Solidification of metals and crystal growth. Wrought metals, deformation, recrystallizations and grain growth. Solid state reaction heat treatment. Tarnish and corrosion. Dental amalgams. Gold and its alloys, silver, platinum and copper. Base-metal alloys: chromium-cobalt, stainless steel, carbon steel, special alloys. Gold alloy soldering. Microscopic examination of dental alloys. Testing the mechanical properties of dental alloys. Wrought base metal alloys, soldering and welding.

MILLWRIGHT

MILL 10/Millwright I
Use and care of hand tools, benchwork, layout and measurement, drilling, reaming, fasteners and anchors, applications and installation, lathe and milling machine operation, ferrous metals and their properties and heat treatment.

MILL 20/Millwright II
Rigging and hoisting, machines and hardware, strength of beams, power transmission devices, shafts, bearings, couplings, clutches, belts, chains, gears, speed reduction units, lubrication, standard tapers, calculations, taper turning, gaskets and gasket materials, non-ferrous metals and their properties.

MILL 30/Millwright III
Pumps, compressors, packing, seals, basic hydraulic theory, hydraulic pumps, piping, motors, cylinders, valves and simple circuits, filters, strainers, transit, theodolite and levels and their applications to alignment of machinery. Review of metallurgy, SAE, and AISI, numbering systems, conveyors.

NUTRITION

NUT 10/Foods and Nutrition
Meat as food, nutritional value of meat products, cooking methods for beef, pork, lamb, veal, poultry and fish products.

NUT 11/Nutrition
This program is designed to assist the student chef in his performance of preparing foods for general consumption commencing with an introduction to the definition of Nutrition and its relation to the daily food needs of the human body.
The composition of foods beginning with Carbohydrates, Proteins, Fats, Calories, Minerals, Vitamins, their values, their vulnerability to improper production methods, the effects of nutritional deficiencies, the Canada Food Rules and the recommendation contained therein, effective methods of preservation by preparation, cooking, holding and storage periods and depreciation of nutritional values by poor purchasing schedules.
One Semester

NUT 100/Nutrition and Diets
Nutritional needs and good health throughout life. The "Canada Food Rules" and selection of foods for a basic normal diet. Composition of foods and functions of the five groups of nutrients: vitamins, minerals, proteins, fats, and carbohydrates. The function of roughage and water. Digestion and metabolism. Modified diets to treat various conditions: variations in caloric content, in texture and consistency, and in nutrient composition. Understanding related medical terminology. Prepared special diet foods: types, styles, packaging, grades, and brands.

NUT 130/Foods and Nutrition
Meat as food, nutritional value of meat products, cooking methods for beef, pork, lamb, veal, poultry and fish products.

NUT 131/Nutrition
This program is designed to assist the student chef in his performance of preparing foods for general consumption commencing with an introduction to the definition of Nutrition and its relation to the daily food needs of the human body.
The composition of foods beginning with Carbohydrates, Proteins, Fats, Calories, Minerals, Vitamins, their values, their vulnerability to improper production methods, the effects of nutritional deficiencies, the Canada Food Rules and the recommendation contained therein, effective methods of preservation by preparation, cooking, holding and storage periods and depreciation of nutritional values by poor purchasing schedules.
One Semester

NUT 300/Nutrition
What is nutrition? Requirements of essential nutrients, Canada Food Law, effects of deficiency and excesses, effect of sex, age, body, size, activity, etc., and some public health aspects. Balanced diets, fat diets, effect of processing and storage upon nutritional quality of food and food products.
Lecture = 3 hours/week.

OFFICE PRACTICE

OP 100/Typewriting
To develop speed and accuracy with emphasis on proper typing techniques; introduction to centering, tabulation, business letter styles, memoranda; preparation of manuscripts and proof reading.

OP 101/Typewriting and Office Practice
To further develop speed and accuracy and to familiarize the student with the requirements, characteristics, and the organization of business offices and the duties most frequently performed. Emphasis will be given to: filing systems and procedures; administrative and receptionist duties of a secretary; sources of information, manuscripts, proof reading and report writing; as well as familiarization with different kinds of office machines. In all assignments a high level of efficiency and production speed will be required.

OP 102/Legal Office Practice
In addition to a further development of typing skills, emphasis will be placed on the preparation of legal documents–tenders, power of attorney, affidavits, wills–as well as handling legal correspondence.

OP 103/Medical Office Practice
To further develop typing skills with emphasis on medical office procedures both for medical stenographers and medical dicta-typists. The preparation of such medical forms as medical records, case histories, reports, and insurance forms will be covered.

OP 104/Medical Dictaphone
To develop dicta-typists capable of accurately transcribing discs, belts, and tapes covering a wide variety of material commonly met with in hospitals. Where possible, actual recordings will be used. Emphasis is placed on accuracy of transcription and spelling.

OP 114/Office Practice
Bookkeeping, receipts for payments and expenses, payroll deductions, balancing, banking, petty cash. A basic course in accounting, typewriting techniques, development of accuracy and speed. Common letter forms, rough drafts, tabulations and simple business forms.

OP 148/Office Practice and Duplicating
Office standards; personal assets; duties of a stenographer; meeting the public; handling routine correspondence; business and office organization; postal information; structure and appearance of business letters; telephone information; telegrams; cables; banking; services for transportation of goods; customs services; duplicating machines; filing procedures, systems and equipment; use of reference books; applying for a position; direct process duplicating; typing masters; photo copying; transparencies and overhead projections; cutting stencils and mimeographing; offset duplicating; making, correcting, filing and storing masters; collating material.

OP 150/Office Practice
The purpose of this course is to thoroughly familiarize the student with the duties performed by secretaries. Filing procedures, systems and techniques are stressed and office type assignments emphasized.

OP 152/Office Practice
To familiarize the students with the requirements, characteristics and organization of business offices; to give the students a thorough familiarization of filing techniques and other duties performed by secretaries. Topics include a thorough study of filing, purchasing, sales and accounting routines, the stenographic, administration, and receptionist duties of the secretary; sources of information; reports; manuscript typing; proof reading; and typing of financial statements.

OP 158/Office Practice
A comprehensive course in Office Practice covering all major topics including filing, mail routines, and telephone usage.

PAINTING AND DECORATING

PAINT 10/Painting and Decorating I
Brushes, tools and equipment: their use, care and maintenance. Paint materials: pigments, mediums, thinners and stainers, origins, characteristics and chemical properties. Preparation of surfaces for painting. Plain painting and varnishing, lining and stencil work, colour theory and practice in colour matching, lettering, safe working practices.

PAINT 20/Painting and Decorating II
Paperhanging I: preparation of new and old surfaces to receive wallpaper, interlining and hanging of conventional wallpapers. Wood staining and varnishing, colour practice, glazing and antiquing.

PAINT 30/Painting and Decorating III
Paperhanging II: Hanging better quality wallpapers and specialty papers. Introduction to the hanging of fabrics and vinyls. Lay-out of wall surfaces. Spray painting: principles of spraying equipment, choice, care, cleaning and maintenancee, paints, varnishes and lacquers applied by spray; health and safety measures.

PATTERNS

PAT 141/Pattern Drafting
Drafting foundation blocks to manufacture sizes—misses, junior, half sizes, women's, children's; drafts of skirts, sleeves, collars, yokes, facings, capes, slacks, hats; basic drafts of a dress, skirt, blouse, suit, coat, evening dress, and lingerie.

PAT 142/Draping
The basic foundation blocks to manufacture sizes with muslin on a judy; such as basic blouse, basic skills, basic sleeves, dress and coat. Also general principles of fitting, studying a fabric; draping a general effect; draping with muslin for details of design.

PAT 143/Design
(1) Forms; (2) Details; (3) Colour; rendering, sources of inspiration.

PAT 144/Grading
How to increase or decrease a sample size pattern according to the standard body measurement. How to grade the following: basic bodice block, basic spirit block, basic sleeve block, basic slack block, basic dress style, basic coat style.

PHYSICAL EDUCATION

PE 161/Swimming and Water Safety
Swimming is a compulsory subject for child care students. Students are expected to reach standard equivalent at least to Red Cross or Royal Life Saving Society Intermediate level. Ability to swim and proficiency in life saving are essential skills for people who work with children, particularly disturbed or handicapped children.

PHYSICS

PHYS 11/Applied Physics
Force: Graphical representation, triangle of forces, turning effect of a force. Strength of materials: stress and strain, factor of safety. Young's modulus of elasticity. Heat: temperature, scales, quantity of heat, effects of heat.

PHYS 12/Applied Physics
Air: Chemical and physical properties, pressure and vacuum, gauge pressure and absolute pressure. Water: chemical and physical properties, density and specific gravity, capillary action. Hydrostatics, principle of the siphon, comparison of lift pump and force pump, principle of the manometer, mercury barometer and aneroid barometer, well and cistern barometer, vacuum pump, pressure at a depth.

PHYS 13/Applied Physics
Air: Physical and chemical properties, pressure and vacuum, effects of variation in pressure on equipment, measurement of pressure, calculation of pressure in ducts. Water: physical and chemical properties, density and specific gravity, calculation of pressure at a depth. Capillarity.

PHYS 14/Applied Physics
Properties of matter: Solids, liquids, gases. Hydrostatics: atmospheric pressure, manometer, mercury barometer, gauge and absolute pressure, principle of the siphon. Hydraulics: Pascal's Laws, fluids under pressure.

PHYS 15/Applied Physics
Air: Chemical and physical properties, density and specific gravity. Hydrostatics: atmospheric pressure, pressure and vacuum, gauge and absolute pressure, measurement of pressure, pressure at a depth, total force on surface, effect of variation of pressure on equipment.

PHYS 17/Applied Science
Chemistry appropriate to hairdressing. Acids, bases, salts. Properties of pure water, tap water. Hard water treatment. Solutions, emulsions, soaps.

PHYS 21/Applied Physics
Review as necessary all principles, operations and formulae from Term 1. Properties of materials: basic metallurgy, ferrous metals. Review: Forces, principle of moments. Machines: principle of machines, mechanical advantage and efficiency, velocity ratio, level, wheel and circle, inclined plane, screw jack, gear drives, belt and chain drives.

PHYS 22/Applied Physics
Review as necessary all principles, operations and formulae from Term 1. Hydraulics: Pascal's law, transmission of pressure. Heat: temperature scales, effects of heat, evaporation, condensation, humidity. Hydrostatics: pressure head, calculation of pressure at a depth. Hydraulics: fluids under pressure, action of pressure pumps, action of the venturi, the water hammer.

PHYS 23/Applied Physics
Review as necessary all principles, operations and formulae from Term 1. Heat: Temperature scale, heat transmission. Strength of materials: Tensile and compressive stress, basic metallurgy of ferrous metals. Heat: Measurement of heat, specific heat of metals and air, calculation of heat capacity, humidity, relative humidity, effects of heat, calculation of expansion.

PHYS 24/Applied Physics
Review as necessary all principles, operations and formulae from Term 1. Gas laws: Expansion and compression of gases, Boyle's Law, vacuum pump, compression pump. Work, energy and power: units of energy, calculations of horsepower. Heat: temperature scales, calculation of heat capacity, specific heat of solids, liquids, gases, coefficients of expansion, expansion of gases, Charles' Law change of state, effect of pressure on BP and FP, sensible and latent heat, BTU graph, transmission of heat.

PHYS 25/Applied Physics
Review as necessary all principles, operations and formulae from Term 1. Heat and temperature: Temperature scales, transmission of heat, change of state, humidity, calculation of quantity of heat. Review: Pressure and force, hydrostatics. Hydraulics: Pascal's Law, fluids under pressure. Machines: principle of machines, mechanical advantage and efficiency, work, energy, power, calculation of horsepower, horsepower of motors and compressors.

PHYS 31/Applied Physics
Review as necessary all principles, operations and formulae from Terms 1 and 2. Friction: Laws of friction, effects of friction, coefficient of friction. Work, energy and power: units of energy and power, calculation of horsepower. Metallurgy: ferrous and non-ferrous metals, heat treatment.

PHYS 32/Applied Physics
Review as necessary all principles, operations and formulae from Terms 1 and 2. Machines: principles of machines, work, energy, power. Properties of water: Electrolysis and corrosion, hard and soft water, Ph factor, water treatment. Heat: The BTU, calculation of quantity of heat, latent heat, heat transfer, coefficient of expansion. Properties of materials: metallurgy of plumbing materials.

PHYS 33/Applied Physics
Review as necessary all principles, operations and formulae from Terms 1 and 2. Machines: Principle of machines, mechanical advantage and efficiency, work, energy and power, calculation of horsepower for fan motors. Properties of Materials: Metallurgy, corrosion and electrolysis, electro-potential series.

PHYS 34/Applied Physics
Review as necessary all principles, operations and formulae from Terms 1 and 2. Properties of steam: latent heat and sensible heat, saturated and superheated steam, calculation of heat content. Heat energy: Comparison of heat and mechanical energy, mechanical equivalent of heat, calculation of efficiency of heating plant, heat losses and prevention.

PHYS 35/Applied Physics
Review as necessary all principles, operations and formulae from Terms 1 and 2. Applied electricity: Fundamental units, electrical units of work, energy, power, basic circuitry. Heat: Latent and sensible heats, changes of state of refrigerants, effects of pressure upon BP and FP, mechanical equivalent of heat. Electrolysis and corrosion: Hard and soft water, water treatment. Properties of trade materials: ferrous and non-ferrous metals, stainless steel piping.

PHYS 100/Applied Physics I
Semester *I*: Fluids: Properties of fluids, hydrostatics, hydraulics. Heat and thermometry: The temperature scales, types of thermometers. Effects of heat: Expansion of solids and liquids, expansion of gases. Heat measurement: Units, specific heat, super heat, chemical efficiency of heating plant. Change of state: The TH diagram for water, nature of boiling and evaporation. Heat transfer: Thermal conductivity measurement, the Stefan-Boltzemann Law.

Semester *II*: Thermodynamics: Laws of thermodynamics, heat engines, horsepower and efficiency calculations. Refrigeration, refrigeration systems, air conditioning, calculation of heat load. Sound: Characteristics of waves, measurement of sound. Doppler principle, acoustics. Lighting: Nature of light, properties of light, illumination and commercial lighting, ray optics, lenses wave optics, polarization.

PHYS 102/Physics
Introduction, time and measurements, space and its measurements, functions and scaling, motion along a straight line, motion in space, mass and the elements, atoms and molecules, the nature of gas, practical physics.

PHYS 103/Physics (Instrumentation)
Friction; heat; light and the electromagnetic spectrum, interference and photoelasticity; X-rays, interference and diffraction; sound, reflection and interference particularly with reference to ultrasonics; electricity and magnetism, D.C. theory, A.C. theory including high frequency production; electronics including two and three element devices, multigrid tubes, rectifiers, transistors, vacuum tube amplifiers, transistor amplifiers; sensing and measuring devices, thermo-electricity, bridge instrument systems, potentiometry, strain gauges, stroboscopy, spectroscopy, basic control theory.

PHYS 104/Applied Physics
A two semester lecture and laboratory course. Particular reference will be made to the application of the fundamentals in the plant and laboratory of the food processing industry.

Semester *I:* Precision of measurement, properties of matter, mechanics, heat and sound.

Semester *II:* Light and optics, electricity, magnetism, electronics and atomic energy.

Lectures = 3; Laboratory = 3 hours per week.

PHYS 110/Applied Physics
Semester *I:* Properties of matter. Systems of measurement, mechanics of rigid bodies. Principles of machines and mechanisms. Work, energy and power.

Semester *II:* Fluid mechanics: fundamentals of electricity.

PHYS 121/Applied Physics
Semester *I:* Heat and temperature, effects of heat, temperature, scales, heat units, specific heat, calorific value of fuels, elements, mixtures and compounds. Basic chemistry of combustion, chemical composition and combustion rates of fuels, transfer of heat.

Semester *II:* Force, work energy and power, horsepower, mechanical efficiency, belt, pulley and gear drives. Friction bearing friction, laws of friction. Electrical fundamentals, electrical circuits, Ohm's law. Electromagnetism. Principles of electrical devices.

PHYS 130/Applied Physics
Semester *I Forces:* Types of force, units, resultants, components of a force, force systems. Principle of moments, couples, levers. Work energy and power. Machines. Mechanical advantage, efficiency, belt and gear drives. Introduction to hydraulics, Pascal's Law.

Semester *II Heat and Temperature:* Effects of heat, quantity of heat. Basic fundamentals of electricity, electrical circuits, electrical devices. Hooke's Law. Stress, strain.

PHYS 131/Applied Physics
Semester *I:* Electricity and magnetism: electrostatics, electricity in motion, non-linear resistors, network theorems, magnetism, inductance, capacitance, principles of electrical devices. Introduction to solid state physics: physics of the vacuum and gaseous tubes, principles of solid state devices, H. Parameters. Electrical measurements: Wheatstone bridge and application, principle of measuring devices.

Semester *II:* Mechanics: vector representation, velocity and acceleration, Newton's Laws, circular motion, work, energy and power. Sound: vibration and waves, transmission of sound, units of measurement. Light: wave optics, ray optics, science of colour. Heat: thermometry, quantity of heat, specific heat, heat transfer, transistor heat sinks, cabinet cooling, mechanical equivalent of heat.

PHYS 132/Applied Physics
Semester *I Properties of Matter:* Molecular structure of matter, capillary action and surface tension, characteristics of solids, liquids, and gases, density, and specific gravity. Hydrostatics: atmospheric pressure, gauge and absolute pressure, barometry, pressure at a depth, gravitational force in fluids, water supply systems. Hydraulics: Pascal's Law, principle of hydraulic devices, principle of pneumatic devices.

Semester *II Heat:* Thermometry, units of heat, calorific value, specific heat, effects of heat, coefficient of expansion, change of state. Gas laws: Charles' Law, Boyle's Law. Work, energy and power: units of energy and power, horsepower, efficiency of machines, principles of machines. Light: wave motion, ray optics, wave optics, interference and diffraction, polarization. Sound: units of measurement, inverse square law. Properties of material, metallurgy of trade materials, corrosion and electrolysis. Force: force diagrams, elementary structures.

PHYS 133/Applied Physics
Air, chemical and physical properties, atmospheric pressure, pressure and vacuum, effects of variation of atmosperic pressure, manufacture of industrial gases. Water: chemical and physical properties, hydrostatics, hydraulics, Pascal's Law, principle of hydraulic devices. Strength of materials: stress and strain, basic metallurgy of trade materials. Heat: effects of heat, thermometry, quantity of heat, specific heats of trade material. Work, power and energy: units of energy and power, potential and kinetic energy. Fundamentals of electricity: DC characteristics, AC characteristics, principles of electrical devices, basic circuitry.

PHYS 134/Applied Science
Semester *I Applied Physics:* Measurement: metric and British units. Density and specific gravity. Heat and temperature: temperature scales, quantity of heat, relative humidity and its effects on printing material. Surface tension and viscosity. Elements of electricity: static electricity, electrical units. Light: reflection and refraction, lenses, inverse square law, colour. Mechanics: simple machines.

Semester *II Applied Chemistry:* The nature of matter, the three states of matter: elements, compounds and mixtures. Solutions and crystallization, evaporation. Physical and chemical changes, atoms and molecules and simple atomic theory. General properties of acids, bases and salts. Ionic dissociation and introduction to pH. Introduction to Organic Chemistry with reference to Screen Printing.

PHYS 135/Applied Physics
Properties of matter, structure of matter. Adhesion, cohesion, surface tension. Concept of force: hydraulics, pressure and density, Pascal's Law, principle of hydraulic devices, principle of pneumatic devices. Electrical fundamentals. Codes.
One Semester

PHYS 136/Applied Physics
Semester *I Heat and Temperature:* Effects of heat, temperature scales, heat units, specific heat, calorific values of fuels.

Semester *II Structure of Matter:* Elements, mixtures and compounds. Basic chemistry of combustion, chemical composition of fuels, combustion rates of fuels, transfer of heat.

PHYS 137/Applied Physics
Semester *I:* Work energy and power, horsepower, mechanical efficiency, torque, prony brake, belt and pulley drives, friction, bearing friction, laws of friction. Heat: effects of heat, mechanical equivalent, temperature, temperature conversion.

Semester *II Basic Electrical Fundamentals:* Ohm's Law, electrical circuits, cells, electromagnetism, electrical measuring instruments, thermocouples, induced voltages and transformers, auto transformers, electromagnetic generators, DC and AC motors, capacitors and capacitance.

PHYS 138/Applied Physics
Semester *I Classification and Properties of Matter:* Change of state; effects of temperature and pressure changes, refrigeration cycle, gauge and absolute pressure. Gas Laws: Law of Partial Pressures and Law of Volumes. Petrochemicals: properties and molecular structure of solvents and refrigerants. Properties of soaps and detergents: scale formation, electrolysis, corrosion, and preventive measures.

Semester *II Measurement:* Density, specific gravity, force and pressure. Lattice structure and mechanical properties of solids: stress, strain, and elasticity of materials. Measurement and transfer of heat. Effects of heat on solids and liquids; linear expansion, thermostatic controls and thermometry. Hydraulic devices. Simple machines: MA, efficiency, and friction.

PHYS 140/Applied Physics
Semester *I Forces:* Kinds, units, resultant, equilibrant, force systems; Principle of Momentum and couples, law, effects and coefficient of friction, centroid and centre of gravity. Work, energy and power: work done by constant and variable forces, principles, mechanical advantage, and efficiency of machines, gear and belt drives, Pascal's Law, hydraulic and pneumatic devices, potential and kinetic energy, equivalence of electrical, mechanical and heat energy, horsepower. Mechanical properties of materials: stress and strain, Hooke's Law, Young's modulus of elasticity.

Semester *II Heat:* Thermometry, effects and transfer of heat, specific and latent heat of metals. Classification of substances elements, compounds. Solutions and mixtures, physical and chemical properties of metals, electromotive series, corrosive of metals. Pure metals: crystalline structure of space, lattice units, allotropes, dendrites. Alloys: types of solid solutions, phases, effects of heat treatment, constitution of diagrams, metallic carbides and intermetallic compounds, formation of the eutectic and eutectoid. Magnets and magnetic substances. Light: reflection, refraction and dispersion of light, optical instruments and magnification.

PHYS 143/Science
Semester *III:* The solar system. The atmosphere. Earth history. Properties of water.

Semester *IV Heat:* kinetic theory, heat transfer, thermometry. Physical properties of matter, physical change. Changes of state. Composition of matter: elements, compounds, mixtures, and solutions. The atmosphere.

PHYS 146/Science
Semester *I Properties* of matter: changes of state, chemical and physical changes, mechanical and physical properties of materials. Properties and composition of air and water: density, specific gravity. Pressure: hydrostatic, atmospheric. Vibratory motion: nature of sound and light. Introduction to heat and thermometry.

Semester *II Heat:* thermometry, measurement of heat, changes of state, heat transfer. Force: units of force, principle of simple machines, types of forces. Work, energy and power. Electricity and magnetism: properties of magnets, electrostatics, current electricity, the electric circuit, electromagnetism.

PHYS 147/Science
Semester *I:* Measurement. Kinematics. Newtonian mechanics. Vectors: application to statics and dynamics; laws of friction. Mechanical energy: work, energy, power. Thermodynamics: thermal energy, heat engines, refrigeration, air conditioning. Material stress and strain: definition, units, determination of simple stress. Electricity and electromagnetism. Introduction to electronics.

Semester *II:* Physical and chemical changes, oxygen, nitrogen, hydrogen, water, solutions and mixtures, fundamental chemical laws, symbols, formulas, equations, ionization, carbon, fuels, sulphur, salt, halogens, periodic table, alkali metals, nitrogen and phosphorous, calcium and magnesium, chemistry in industry.

PHYS 150/Science
Metric system; density; specific gravity; electrostatics. Thermometers; heat; hydrostatics; measurement of pressure; vacuum pump; solids; liquids; solutions; sterilization and sanitation.
One Semester

PHYS 200/Modern Physics
Semester *I Electromagnetism:* The spectrum. Atomic physics: Bohr atom and line spectra, waves and particles, modern atomic model and Schroedinger wave equation, solid state physics, crystalline solids, classification by structure and by energy.

Semester *II Structure and Behaviour of Metals:* Physical states, alloy structure and behaviour of semi-conductors, theory of semi-conductors, semi-conducting materials, semi-conductor devices. Nuclear physics: introduction, relativity and the mass, energy equivalent, radioactivity, nuclear particles, nuclear energy.

PHYS 201/Physics
Light: reflection, mirror images, lenses, binoculars, telescope; refraction, index, dispersion; particle theory; waves studies; interference, Newton's law of motion: vectors, work, energy, momentum; heat.

PHYS 202/Thermodynamics
Semester *I Energy Transformations:* Definition of terms, the PV diagram. Laws of thermodynamics, the gas laws: characteristic gas equations, work done by gases, Joule's equivalent.

Semester *II Indicator Diagrams:* Calculation of thermal efficiencies, ideal engine cycles, comparison of engine efficiencies. Heat transfer: conduction by radiation. Entropy: changes of state, isobaric, isochoric, isothermal, abiabatic, and polytropic.

PHYS 210/Applied Physics
Semester *I Hydraulics:* Principles of hydraulic devices and systems. Pneumatics: principles of pneumatic devices and systems.

Semester *II:* Principles of electrical systems and operating principles of electrical devices. Fundamentals of computer analysis. Codes and safety.

PHYS 310/Physics
Principle of the hydrometer, use of the hydrometer, in shipboard practice, effect of expansion and contraction in liquids and relationship to liquid cargos, a review of hydrostatics and heat, problems from general science. The manometer, thermometers. Review problems from general science. Anometers, the vector principle in anometers, light in relation to its usages in navigation.
One Semester

PHYSIOLOGY

PHY 100/Physiology
Introduction to physiology; physiological concepts, digestion and nutrition, body fluids; body framework, circulation and respiration; excretion; reproduction; the nervous system; metabolism. Lecture = 3; Laboratory = 3 hours per week.

PLASTICS

PL 100/Materials/Thermoplastic
Fundamentals and characterization of polymers. Introduction to basic resins. Engineering thermoplastics and natural polymers. Identification of plastics and elastomers by simple tests.

PL 103/PL 132/Materials/Thermoset
History and introduction to polyester and epoxy resins. Reinforcements and fillers. Composites. Strength of material definitions.

PL 110/Processes/Thermoplastic
Basic theory and application of thermoplastic processes. Mixing and dispersing, extrusion, injection moulding, calendering, blow moulding, sheet forming, sealing and welding, coating and machining.

PL 113/Processes/Thermoset
Theory and application of reinforced thermosetting plastic processes. Pattern and mould making, hand lay-up, spray-up, filament winding.

PL 120/Design/Thermoplastic
Design of plastic parts and processing equipment. Materials selection. Selection of a process. Part design, injection mould design, extrusion die design, design of moulds for hollow formed articles, auxiliary equipment.

PL 123/Design/Thermoset
Design characteristics for glass fibre reinforced plastics. Throw-away and plastic tooling. Reinforced plastic moulds and tooling. Wooden and metal moulds. Cost estimating.

PL 125/Plastic Fundamentals
Materials, processes, design, thermoplastics, and thermosets.

PL 130/Materials/Thermoplastic
Introduction to basic resins. Engineering thermoplastics and natural polymers. Identification of plastics and elastomers by simple tests.

PL 131/Materials/Thermoplastic
Thermoplastic sheets, rods, tubes and profile shapes. Solvents and adhesives. Properties of polyvinyl chloride, acrylics, polyethylene, polypropylene and other materials used in forming and fabricating of thermoplastics.

PL 132/Same as PL 103

PL 133/Processes/Thermoplastic
Basic theory and practice in the operation of processing equipment. Extrusion; injection and blow moulding.

PL 134/Processes/Thermoplastic
Basic theory and practice in the operations of sheet forming, sealing and welding, casting, coating and machining of thermoplastics.

PL 135/Processes/Thermoset
Theory and practice in pattern and mould making, hand lay-up, spray-up, filament winding.

PL 136/Design/Thermoplastic
Mould and die design, machine design. Cost estimating.

PL 137/Design/Thermoplastic
Design of machines, jigs and fixtures, tooling. Cost estimating.

PL 138/Design/Thermoset
Throw-away and plastic tooling. Reinforced plastic moulds and tooling. Wooden and metal moulds. Cost estimating.

PL 139/Design/Thermoset
Mould and die design, machine design. Cost estimating.

PL 140/Same as PL 203

PL 141/Processes/Thermoset
Theory and application of moulding thermoset materials. Matched die moulding, compression moulding, transfer and injection moulding.

PL 200/Materials/Thermoplastic
Fluorine polymers. The new plastics. Reinforced thermoplastics and elastomers. Material testing. Product testing. Material selection.

PL 203/PL 140/Materials/Thermoset
Properties, chemistry, curing and quality control for thermosetting resins. Polyesters, epoxies, alkyds, phenolics, silicones, amino resins, furanes and polyurethanes.

PL 210/Processes/Thermoplastic
Advanced theory and application of thermoplastic processes. This course covers the same processes as listed in PL 110, but in greater depth.

PL 211/Processes/Thermoset
Theory and application of moulding thermoset materials. Matched die moulding, compression, transfer, and injection moulding.

PL 220/Design/Thermoplastic
Advanced design–process selection, mould and die design, product design. Auxiliary equipment, jig and fixture design. Cost estimating.

PL 223/Design/Thermoset
Mould and die design, machine design. Cost estimating.

PLASTERING

PLAS 10/Plastering I
Job conduct, responsibilities, tools of the trade, aggregates, gypsum, limes and portland cement, plaster backings, solid partitions, fire ratings, types of arches, related geometry, layout, areas and estimating, construction of small moulds and bench work.

PLAS 20/Plastering II
Duties of a mechanic, duties of a foreman, use of spirit and water level, squaring of rooms, flat and beamed ceilings, running of moulds, cutting and planting run bench work, mitring, stops and returns, repair work.

PLAS 30/Plastering III
Layout for grain and dome ceilings, related geometry, arches, mitring, acoustic tile layout, different types of moulds, acoustic materials, safety practices, texture work, small castings.

PLUMBING

PLUM 10/Plumbing I
Safety precautions, steel pipe, measuring pipe, linear measure, calculation of 45 offset, lead, solder, and fluxes. Types of cast iron joints, hand tools and wrenches, heat transfer, properties of water, copper D.W.V., cast iron M.J., fundamentals of a good plumbing system, drainage terms, building trap, cleanouts and location, purpose of a drain plan. How to draw a drain plan, drain design, sanitary (function of) floor drains, storm (function of) RWL foundations drains, municipal sewers, municipal drains, underground and above ground drainage materials. Joining dissimilar pipe material, pipe supports and managers. Purpose of stack elevation, plumbing fixture traps. Component parts of a stack pipe, stack footings, roof flashings, stack terminals, purposes of venting, siphonage, trap seal loss, glass pipe demo, requirements between a fixture trap and vent. Trap and vent sizes. Prohibited fittings and connections, types of individual vents, upper and lower vent connections, dual venting, how to draw a stack elevation, stack elevation, simple wet venting, fixture units and hydro loads, assignment work, simple group vent sizing.

PLUM 20/Plumbing II
Residential HW tanks and heaters, British thermal units, T. and P. valves, temp. conversion review and expand waste and vent size, review stack elevation work, expand on stack venting, stack elevation, domestic dish and clothes washers. Class I floor drains, methods of mechanical priming, drain plan, grading waste pipes, valves, location of valves, water services, meter and bypass, WC bowls, areas and volumes, pressures and heads, basic pumps, WC tanks and ball cock valves, rough-in fixture cuts, combined drainage system, drains on filled ground, datum line, instrument readings, grading assignment work, blow down tank, oil interceptors, sumps and ejectors, loop and circuit venting, stack elevation, yoke venting, offsets in stacks, combined vent terminals, grease interceptors, sleeving.

PLUM 30/Plumbing III
Pressure and heads, commercial HW tanks, indirect heaters, Domestic HW circ. lines and pumps, water hammer, water supplies to high buildings, pressure reducing valves, tempering valves, cross connection, source of water, well pumps, hydro pneumatic systems, water softeners including demonstration, fire line installation, water pipe testing, special fixture trap locations, indirect and special wastes, corrosive drainage materials, septic tanks, disposal beds, rolled offset, friction loss in water piping, semi-combined drainage system, municipal water treatment, hospital fixtures, ventilation of washrooms. Rigging, pipe sizing and maintenance, isometric piping drawing and material take-off.

PROSTHETICS AND ORTHOTICS

PROS 100/Introductory Orthopaedics
Early surgical techniques and their modern development. The development of prosthetic and orthotic devices including: below the knee, above the knee and upper extremity prostheses; upper extremity, lower extremity and spinal orthoses.

PROS 101/Materials and Shop Techniques
A practical study of the hand and machine fabrication of components from ferrous and non-ferrous metals, plastics, leather, fabrics and plaster. This will include the techniques of filing, reaming, tapping, machine tool practice, forging and heat treatment of metals.
Reinforcing materials, hand lay-up procedures, vacuum forming, fastening, polishing and buffing of plastics.
The making of paper patterns, seams, stitching types, draping, felting and moulding of leather and fabrics; the manufacture of plaster moulds and models including the use of plaster bandages, as well as the types and applications of adhesives and other fastening devices.

PROS 200/Orthotic and Prosthetic Techniques
Casting, moulding, modifications, laminations, fabrication, installation of hardware and jigs in preparation for use by patients, including prosthesis and orthesis for upper and lower extremity deficiencies.

PROS 202/Materials and Shop Techniques
Properties of materials such as wood, leather, metal and plastics and their clinical applications in various types of prostheses.

PROS 203/Field Practice
Participation in various clinics, amputees assessment, formulating prescriptions, working with other members of the rehabilitation team. Visits to recognized establishments and working in a practical environment.

PROS 300/Advanced Orthotic and Prosthetic Techniques
Application of immediate post operative prosthesis, continuing programming, modular prosthetics. Plastizotes, silicones, vitrathenes and new materials as they are introduced.

PROS 301/Physical and Occupational Therapy
Patient treatment with considerations given to levels of activity, age, occupation and eventual rehabilitation into society.

PROS 302/Research Project
The project will enable the student to apply his theoretical knowledge and practical ability to the design, fabrication, testing and acceptance of prosthetic/orthotic components to meet the requirements and standards of the profession.

PROS 303/Field Practice
Involvement with patients for the actual fitting, design and fabrication from prescription with consideration given to clinical assessment, in conjunction with certified member of Prosthetic/Orthotic profession.

PSYCHOLOGY

PSY 160/General Psychology
This is an introductory course. Study of the response capabilities of human beings leads to consideration of human motivation, perception and the learning process. Theories of personality development and the concept of roles are discussed. The nature of intelligence and psychological testing together with the meaning of elementary statistical terminology are related to the study of children.

PSY 200/Psychology
A general introductory course to the study of human behaviour with consideration given to human motivation, perception, and the learning process. Theories of personality development, the concept of roles and the nature of intelligence will be discussed.
One Semester

PSY 201/Business Psychology
Formal and informal organizations. Consumer motivation. Consumer analysis, depth interviews, attitude and opinion surveys. Theory of psycho persuasion.
One Semester

PSY 202/Psychology
Clinical approach to the new amputee. Basic understanding of some of his problems and how to deal with them. Environment and family acceptance of amputees.

PSY 203/Rehabilitation
Pre-prosthetic training and post-operative care. Clinical assessment with members of the rehabilitation team.
Immediate post-operative fittings, continuing treatment in socket design to keep patients ambulatory.
Stump conditioning and exercise.

PSY 204/Industrial Psychology and Salesmanship
A study of the application of psychological methods and principles in business and industry. Personnel selection, factors involving efficiency. Factors in selling process: buying habits, motives. The pre-approach, the approach, the presentation, the close.

PSY 205/Applied Psychology
As related to patient management. Procedures involving children and adults in the reception area, operatory, and business office.

REFRIGERATION AND AIR CONDITIONING

REF 10/Refrigeration and Air Conditioning I
Introduction to refrigeration history and development, thermodynamics functions and mechanical principles. Heat and temperature definitions, types of systems, refrigeration cycle, properties of refrigerants, handling of refrigerants, safety factors, compression system, types of components, evaporators, condensers, receivers, compressors, refrigerant flow controls, expansion valves, accessories, system servicing, charging and purging of systems. Refrigerant oils, installation procedures of special components, heat exchangers, accumulators, oil separators, water regulating valves, initial introduction to operation of cooling towers, evaporative condensers, early stages of psychrometrics; terminology and charts.

REF 20/Refrigeration and Air Conditioning II
Control operation, pressure and thermostatic, use of external and internal equalized valves, pressure controls, operating and limit, temperature, direct and remote applications, safety controls, DC and AC motors, motor controls, test instruments, motor starting devices, refrigeration piping considerations, piping installations. Water treatment for cooling towers and evaporative condensers. System contamination, cleanout procedures; acids in systems, testing and cleanout procedures, methods of defrosting, insulation factors, thermal conductivity, installation procedures, air removal, leak testing, charging, control setting, service analysis and operation. Review of silver brazing practices.

REF 30/Refrigeration and Air Conditioning III
Air conditioning fundamentals, properties of air, comfort zone, effective temperatures, relationship of psychrometric terms, use of the psychrometric terms, use of the psychrometric chart and application, sensible and latent heating and cooling, load calculations, types of loads, use of tables, equipment selection, coils and condensing units, low temperature applications, freezing methods. Multiple systems, piping hook-up and operational requirement, multiple system accessories, evaporator pressure regulators, crankcase regulators, check valves. Centrifugal compressors, operation and service requirements. Dehydration of equipment, use of deep vacuums, survey of refrigeration principles, preservation of foods, storage conditions, temperatures, humidity, air motion, motion, product chilling, relative humidity. Air velocity, product shrinkage, pneumatic control systems. Review of silver soldering techniques, service analysis.

REF 130/Refrigeration Theory
Introduction to refrigeration, description of history of trade, refrigeration fundamentals, heat and temperature definitions, vapor compression system, refrigeration cycle, types of systems, properties and handling of refrigerants, safety factors, system components, evaporators, condensers, receivers, refrigerant controls, pressure and thermostatic valves, safety controls, thermometers and gauges, accessories, lubrication, air conditioning controls and principles, humidity characteristics, heat loads, wet bulb, dry bulb readings, electrical controls, motors, starting devices, electrical servicing, installation problems, use of tables and charts, troubleshooting.

REF 131/Refrigeration Practice
Tools of the trade, characteristics of silver brazing, brazing copper joints, brazing dissimilar metals, tube bending, practical project assignments, flaring copper tubing, compressor dismantling, identification of component parts, assembly procedure of compressors, electric motor inspection, electrical control inspection, purging, leak testing, charging systems, primary system installations, servicing installations.

SANITATION

SAN 10/Sanitation and Hygiene
Introduction to established minimum standards for plant sanitation and safety in food service. Legal safeguards in food sanitation, food-borne illnesses, personal hygiene and sanitation. General considerations relating to food-borne illnesses. Sanitation principles to do with all phase of food service.

SAN 11/Sanitation, Hygiene and Safety
Semester I: This program is designed to make the student aware of the individual responsibility of safety, sanitation and hygiene, when related to the production, storage, and disposal of all food stuffs cooked or in the raw state, commencing with fire and accident prevention, public health regulations, personal hygiene, the cleaning maintenance of all working and storage areas, food poisoning and its implications, pest and rodent control, the cleansing of all utensils that are used by the dining public, the awareness of contamination of foods by airborne and carried bacteria, and the safe use of detergents, deodorants and disinfectant materials.

SAN 100/Sanitation and Hygiene
Cause and prevention of food-borne illnesses. Sanitary maintenance of all areas of food service establishments. Sanitary handling of food, beverages, equipment and other materials in storage, preparation, and service. Proper use of various cleaning materials, illustrated by representatives of sanitation products manufacturers. Legal responsibility to maintain sanitation standards.

SAN 130/Sanitation, Hygiene and Microbiology Techniques
Types of organisms; food spoilage; bacterial growth; food poisoning; food borne organisms; methods of control; regulations; principles of hygiene; cleansing materials and methods.

SAN 131/Sanitation and Hygiene
Personal grooming and cleanliness, equipment sanitation, supplies available for sanitation, control of accident hazards. Health regulations pertaining to meat industry, types and causes of food-borne illness.

SAN 132/Sanitation, Hygiene and Safety
Semester *I:* This program is designed to make the student aware of the individual responsibility of safety, sanitation and hygiene, when related to the production, storage, and disposal of all food stuffs cooked or in the raw state, commencing with fire and accident prevention, public health regulations, personal hygiene, the cleaning maintenance of all working and storage areas, food poisoning and its implications, pest and rodent control, the cleansing of all utensils that are used by the dining public, the awareness of contamination of foods by airborne and carried bacteria, and the safe use of detergents, deodorants and disinfectant materials.

SAN 300/Sanitation and Pollution
Organization and supervision of a sanitation program in the food industry. Importance of and how to schedule a program. The chemistry of cleaning, detergency and types of cleaning compounds. Methods of disinfection and sterilization, mechanical and/or chemical cleaning methods, CIP and ultra-sonic methods. Sanitary aspects of buildings and equipment, water treatment, and supply. Waste treatment and disposal. Insects, rodents, etc., and their control. Inspection techniques and reporting.
Lecture = 2 hours per week.

SMALL BUSINESS MANAGEMENT

SBM 10/Small Business Management
Business mathematics; fundamental operations, interest, trade discounts. Basic bookkeeping; the balance sheet, classified financial statements, special journals. Business practice; retailing, contracts and credits, insurance, banking and interest, taxes, licensing and lease, causes of business failure, forms of organization, promotion plan and policies.
One Semester

SBM 132/Small Business Management
The following topics will be covered: Business Mathematics; Basic Bookeeping including journals, ledgers, financial statements, adjusting and closing entries, special journals; Business Organization; Business Law including contracts, taxation, customs, labor legislation, property; Sales and Advertising.

SBM 232/Small Business Management/Bookkeeping
Semester *I:* Balance sheet, journal and balance sheet accounts, journal profit and loss accounts, ledger, work sheet.

Semester *II:* Special journals, financial statements, adjustments, closing the books, accounts payable, receivable. Special bookkeeping project.

SBM 332/Economics
Semester *I:* Personal money management: pensions, Capital investment, budgeting, installment buying. Credit: extended credit to consumer, personal use of credit, assisting credit agencies. Business, personal insurance: insurance as a basis for investment, relation to estate planning.

Semester II Banking: Policies and application for single ownership business. Supply, demand: elasticity as it applies to merchandise. Business cycle: fiscal, monetary policies. Human relations: graduation to the business world, responsibility, discipline, effective use of personal qualifications, courtesy in correspondence. Government law and regulations: standards applicable in business, employment, advertising, and labelling. Sales: the role of the letter in sales.

SEWING

SEW 141/Industrial Power Sewing
The following topics will be covered: single needle straight sewing machine; machine maintenance; basic techniques in power sewing; familiarization with three special machines such as the one needle, two needle and blind stitch machines; machine maintenance; fabrication of plain and simple garments; application of acquired techniques with emphasis on both workmanship and speed.

SIGNWRITING

SIGN 130/Basic Signwriting and Introduction to Screen Printing
Materials used in the trade; selection and care of brushes and equipment, preparation of surfaces, letter practice, colour theory for signwork; trade drawing, design and layout, punctuating for signwriting, introduction to heraldry and gilding. General introduction to Screen printing, Hand cut stencil making direct and indirect stencil making, printing, hand and mechanical.

SHEET METAL

SM 10/Sheet Metal Mechanic I
Seams of trade, metals of trade, soldering coppers, forging and trimming copper, fluxes of the trade, rivets, cleats used in duct construction, equipment and tools, measurements, rules, tapes, etc., hand tools and their proper uses, hand operated bench machines, stakes of the trade and their uses. Basic pattern drafting; parallel line development of patterns for shop projects of the basic course.

SM 20/Sheet Metal Mechanic II
Shop safety, metals of the trade, new materials, bond allowances on heavy materials and aircraft sheet metal work, expansion metals, coping, flashing, metal roofing and seams used. Heating and air conditioning; meaning of air conditioning, process and comfort air conditioning; differences, control of climate, humidity and its effects, methods of heat travel, meaning of BTU Methods of finding heat loss and heat gain, furnaces; history of development: 100 BC to now, symbols used in duct design, residential duct systems, complete layout of typical small house. Pattern drafting. Radial line development and parallel line for projects fabricated.

SM 30/Sheet Metal Mechanic III
Duct construction materials, fasteners used in the trade, turning vanes used in elbows, construction of high velocity duct work, air conditioning and/or ventilation: definitions, psychromatic charts, fans and fan laws, static and velocity pressure, friction losses in fittings and meaning of the equivalent length, registers and grilles and pressure losses incurred, explanation of duct sizing methods, equal friction methods, static regain method, complete commercial and industrial duct layout by each method, types of equipment used. Pattern drafting advanced: radial triangulation methods of pattern development for shop projects fabricated in advanced course.

SHORTHAND

SH 100/Pitman Shorthand

To develop the facility of writing Pitman shorthand at speeds up to 100 wpm and of transcribing the shorthand notes on the typewriter. In the initial stages the emphasis will be on shorthand theory, common short forms, and phrases: later, office-style dictation and practice in transcribing notes on the typewriter will be introduced. Lessons are conducted in a modern shorthand laboratory.

SH 101/Machine Shorthand

To develop the facility of writing machine shorthand at speeds up to 100 wpm and of transcribing the shorthand notes on the typewriter. In the initial stages the emphasis will be on shorthand theory, common short forms, and phrases: later, office-style dictation and practice in transcribing notes on the typewriter will be introduced. Lessons are conducted in a modern shorthand laboratory.

SH 102/Legal Shorthand

To further develop the speed and accuracy of writing and transcribing shorthand notes of legal correspondence, reports, and documents, with emphasis on legal vocabulary building. Notes may be taken in either Pitman or Stenotype shorthand.

SH 103/Medical Shorthand

To further develop the speed and accuracy of writing and transcribing shorthand notes of medical correspondence, reports, and documents, with emphasis on medical vocabulary building. Notes may be taken in either Pitman or Stenotype shorthand.

SH 149/Shorthand (Pitman, Machine, Forkner)

An initial period is spent in the study of the theory of the system, accompanied by as businesslike dictation as possible within the bounds established by the vocabulary presented up to that particular time. In this way the development of speed in writing Shorthand is begun at a very early stage in the course. As the course progresses increasing emphasis is placed on the development of facility in writing and reading Shorthand notes in the 2,000 word vocabulary range with additional practice in a more extensive vocabulary. Attention is also given to form, correct spelling, work division, punctuation and proper English usage.

SCREEN PRINTING

SP 130/Screen Printing

Appreciation of basic layout, typography and illustration; hand cut stencil making. Preparation of direct and indirect stencils. Hand and machine printing on various materials and surfaces. Fundamentals of electric circuitry, printing-operation of the process camera. Line and half-tone film making.

STEAMFITTING

STEA 10/Steamfitting I

General introduction, safety rules, types of tools used, use and care of tools, types of piping and fittings, standard practice of measuring piping, types of valves and gauges, types of radiators, convectors, heaters and coils, expansion and cushion tanks, types of boilers used in hot water heating systems, sizing and erection of boilers, filling, testing and operating hot water heating systems, types of hot water heating systems, gravity hot water, open and closed, two pipe forced hot water, direct return reverse return, one pipe hot water, baseboard heating, radiant heating, snowmelting systems, upfed and downfed systems, basic principles of controls (hot water) methods of zoning systems.

History of heating, safety precautions, steel pipe, piping materials, pipe threads, thread and piping allowance, measuring pipe, type of hangers, hanger attachments, offset measuring, grading of pipe, expansion of pipe, transfer of heat, properties of water, temperature conversion, temperature and pressure, latent heat, specific heat, BTU calculations, valves, types of boilers. CI type and sizing, convectors, unit heaters, gravity hot water systems, direct return and reverse return, piping riser and mains, radiation below mains, expansion and cushion tanks, open to closed conversion, forced hot water systems and circulating pumps, special fittings, assignment, one pipe system, up feed, down feed, air cushion tanks (forced), single circuits, double circuit, multi-circuit, balancing systems, baseboard heating, piping elevations, isometric view, radiant heating, control.

STEA 20/Steamfitting II

Method of zoning, reasons, piping, template development, zoning piping, zoning special fittings, piping elevations, primary and secondary, convertor types, applications, three-way valves, properties of steam, boilers, one and two pipe steam system, steam traps, return trap system, return trap piping, return trap equipment, condensate return pump cycle, vacuum return pump cycle, recall temperature and pressure relationship, vacuum pump, piping, temple and development, accumulator tank, lift fitting and controls, sub-atmospheric system, heat balancer, control valve, differential controller, selector and thermostats, high pressure systems, high and low pressure systems, high pressure steam plants, super-heaters, economizers, injectors, condensers, etc.

STEA 30/Steamfitting III

Description of steam heating systems and basic principles of cooking, pneumatic controls, air-conditioning and power house work including one pipe systems, two pipe systems, vapour systems, return trap systems, condensate return pump, vacuum return systems, high and low pressure systems, types of boilers, boiler connections, supply and return mains, stop and check valves, boiler water supply and controls, feed pumps and injectors, blow down connections, types of safety valves, types and purposes of steam traps, feed water heaters, wet and dry returns, condensate receivers, accumulator tank, vacuum pumps, pressure reducing valves, economizers, air eliminators, separators, exhaustheads, condensers, evaporators.

Review of basic and intermediate course, high temperature, high pressure, hot water systems, theory of combustion, firing, fuels, refrigeration and air conditioning, gas code and fittings, rigging, introduction to pneumatic controls. Isometric piping, drawing and material take-off.

STRUCTURAL STEEL DRAFTING

STR 10/Structural Steel Drafting I

Force Systems: components, resultants, equivalence; centroids, equilibrium, force analysis of structures; stress, axial, shear, bearing: stresses on oblique planes; working stress and factor of safety; strain elasticity; shear and moment in beams, stresses in beams; drawing office procedure; fabrication of structural steel, plain material, specification; bolted connections; types of fasteners, shear and bearing in bolted connections; welded connections: weld types, welding symbols, stress in concentrically loaded welds. Smoley's parallel tables.

STR 20/Structural Steel Drafting II

Moments of inertia, radius of gyration, section modulus, flexure formula, stresses in built-up beams; deflection of beams, columns: Euler's equation, empirical formulas, design of beam bearing plates and column base plates. Fasteners in combined shear and tension; stresses in eccentrically loaded welds, special beam connections. Smoley's tables, column details.

STR 30/Structural Steel Drafting III

Combined axial and bending loads; eccentrically loaded columns; sloped and canted beam connections; moment connections; graphical and numerical stress solutions for axial stresses in trusses, truss panel point connections, bracing members, comber in trusses. Detailing of welded truss, welded plate girder. Smoley's tables.

STR 122/Structural Detailing

Review of basic drafting principles and equipment. The application of standard structural details for structural steel, reinforced concrete and timber construction for foundations, footings, columns, beams, slabs, joists, bars, etc. The preparation of design and detail drawings within the discipline of steel, concrete and timber in general.

STR 212/Structural Steel Problems and Drawing

Drafting office routines, shop practice, detailing and related design of bolted and welded connected column bases, column splices; skewed, sloped and canted beam connections, hip and valley construction. Practice drawing of suitable projects.

STR 213/Reinforced Concrete Problems and Drawing

Detailing and related design of various beam and column types, floor systems, retaining walls, spandrels, cantilevers, stairs, slabs. Preparation of design drawings, preparation of placing drawings from design drawings. Introduction to computer detailing, prestressed and precast concrete problems and drawings.

STR 214/Project Drawing

Project drawing from design sketches, specifications and standards to develop complete sets of structural drawings, design and detail drawings of entire structures such as commercial, industrial and institutional buildings with reinforced concrete and structural steel as the major construction materials. To prepare drawings of buildings using the systems approach with the following sub-systems: structure, atmosphere, lighting/ceiling interior space division, vertical exterior skin, plumbing, electri/electronics, roofing flooring. Study of existing system projects, such as Metro Toronto's "Study of Educational Facilities" (SEF) and others.

SURVEYING

SURV 100/Survey Computations and Drafting
Introduction, elements of surveying, ink drawing, mechanical lettering, Ontario Land System, bearings and azimuths, survey calculations, closures, missing courses, route location plans, topographical plans, site plans, contouring, profiles. Calculations of bearings and azimuths, plotting angles, interpretation of legal boundary notes, plot of simple boundary, survey monumentation, plot of elevations, contours, profiles, topographic details, tracing in ink, mechanical lettering, review of trigonometric ratios of right angles, logarithms, areas, closures, DMDs.

SURV 101/Plane Surveying
Fundamental principles of surveying, steel tapes, chaining methods, errors in chaining, basic construction of transit, use of transit, use of theodolite, producing line, traversing, levelling, level notes, stadia, field procedure for topographical surveying, and basic construction layout.

SURV 110/Surveying
Horizontal and vertical measurement, use of survey instruments, site plan development, sub division planning, zoning by laws, legal computations and graphics, stake out of buildings.

SURV 130/Surveying
Levelling, contours, profiles, gradients, topographic plans and symbols, site plans, azimuths, bearings, Ontario Land System, legal, plans, ink drawings.

SURV 200/Survey Computations and Drafting
Review of fundamentals and elements, legal surveys, plans for land exchange, easements, expropriation. Survey calculations, route location plans, profiles, gradients, vertical curves, cross sections and earth work quantities.

SURV 201/Advanced Plane Surveying
The field work required to produce good quality 3rd order control over a large area using geodetic co-ordinates with electronic equipment and second reading theodolite. The adjustment and computation of the results by regular methods and by electronic computer. The drafting of the final plan.
Curves: The selecting, calculating and laying out of simple curves. Typical curve problems with the greatest emphasis placed on intersections of curves with other lines. Transition curves and multiple curves. The use of computer in the solution of curve problems.

SURV 202/Photogrammetry
Theory of photogrammetry, history and development, stereoscopic observation, ground control methods, mapping procedures, mosaics, uses and applications. Ures, mosaics, uses and applications.

SURV 203/Practical Astronomy
Polaris observation for meridian, explanation, field procedure, calculation procedure, determination by astronomic observation of longitude, time, latitude, the Astronomic triangle, determination of the azimuth of a line, sun observation, correction, use of tables, calculation procedures, sufficient spherical trigonometry for the solution of all above.

SURV 204/Legal Surveying
Registry office; land titles office; history and development; types of documents and plans; government acts; expropriation procedures, plans; methods of registering; legal transfer and general procedures, deeds, description of township offices, field trips to registry, land titles and township offices.

TAPING/DRYWALL

TA 130/Taping/Drywall
Job conduct and safety regulations. Board application, tape and types of adhesives, tools, quantity take-off, fire ratings of wall and ceiling assemblies, arch construction and fabrication, sanding, priming sealer coats, textured finishes.

TESTING

TEST 100/Elements of Testing
Characteristics, application and limitations of tensile compression, impact, hardness and fatigue tests. Types, characteristics, application and limitations of visual inspection, dye penetrants, magnetic particle inspection, radiography, ultrasonics, eddy-current, infra-red and strain gauge testing.

TEST 200/Testing Techniques
The theory and application of the following non-destructive test methods; penetrant inspection, magnetic particle, radiography and fluoroscopy, ultrasonics, infra-red, liquid crystal techniques, strain gauges, and eddy-current systems.

TOOL DESIGN

TD 100/Jig Fixture Design I
Freehand sketching and machine drafting of basic jig and fixture designs, emphasizing current production methods and organizations.

TD 101/Jig Fixture Design II
Freehand sketching and machine drafting of advanced jig and fixture designs, emphasizing current production methods and organization.

TD 102/Jig Fixture Design III
Freehand sketching and machine drafting of assembly and welding jigs and fixtures and welding fixtures, emphasizing current production methods and organization.

TD 103/Jig Fixture Design IV
Freehand sketching and machine drafting of cutting tool design, multi-tool layouts and gauge design emphasizing current production methods and organization.

TD 110/Metrology
History and basic principles: basic instrumentation, dial gauges and test indicators, surface plates, micrometers and verniers, gauge blocks, optical instruments and testing. Surface finish screw threads, gears. Angular measurement, fixed gauges, air gauging, autometrology.

TD 200/Die Design
Freehand sketching and machine drafting of basic blanking, piercing and cut-off and bending dies.

TD 201/Die Design II
Freehand sketching and machine drafting of advanced blanking, piercing and bending dies. Introduction to basic draw dies.

TD 202/Die Design III
Freehand sketching and machine drafting of advanced draw dies and complex blank, pierce and bend progressive dies.

TD 204/Process Engineering
Process Engineering Functions: The selection of process of manufacture. Manufacturing sequence. Primary processes. The selection of manufacturing tools and equipment. Standard machine tools. Special equipment, integrated equipment and automation. Ordering systems, production control and cost estimates. Plant layout, economic factors, product flow, cost analysis and control.

TD 205/Die Design
Freehand sketching and machine drafting of basic blanking, piercing, cut-off, bending, draw and progressive dies.

TD 206/Quality Control
History and terminology. Conformance and design factors. Quality control tools and techniques. Statistics, testing, communications, inspection. Design review, cost analysis. Auditing, procedures, training, motivation. Tool and gauge control. special studies, field and shop complaints, standard, scrap and rework data. Variability and frequency distributions, normal distribution, probability. Graphical frequency distribution analysis, control charts, acceptance sampling.

TD 207/Industrial Engineering
History and background of modern industry; general aspects of industrial organization and management; principles of organization and management. Plant layout, location and construction; handling of materials. Production and inspection, quality control, control of production. Time and motion study; material control; plant and equipment safety. Industrial relations and incentive payments. Personnel selection, training, human relations and labour organization.

TYPING

TYP 148/Typewriting
Parts of typewriter; letters and characters of keyboard; technique; word division; centering, horizontal and vertical; tabulation; letter styles and punctuation; addressing envelopes; folding and inserting letters; carbon copy exercises; circular letters; programs and menus; bank and financial statements; electric typewriter practice; practice on transcribing units; typing legal documents.

TYP 149/Typewriting
The purpose of this course is to develop typewriting skills to achieve 50 wpm on 10-minute tests and to cover the theory of centering and tabulation for business letters.

TYP 152/Typewriting
To achieve a thorough mastery of the keyboard using the touch typewriting system; applications of practical typing including the letter styles, tabulation, centering, carbon copies, envelopes, business forms, erasures and corrections, squeezing and spreading, and duplicating. Speed to be attained: 40 wpm on 10-minute tests.

TYP 156/Refresher Typewriting
A review of keyboard and practical techniques–speed development. A review of Office Practice topics. As this is a Refresher course those topics stressed will depend upon the requirements of the individual student.

TYP 157/Typewriting and Office Practice
The objectives of this course are: (a) to achieve a thorough mastery of the keyboard using the touch system, plus basic typewriting setups; and (b) to achieve 45 to 50 wpm on 10-minute tests. Typing will be taught using the Lumisonic System–for both beginners and those having typed previously. Office Practice will be devoted to a discussion of business-oriented topics such as: business organization, sales, purchasing and accounting routines, office standards, filing systems and procedures, and duties of office personnel.
When typing ability permits, topics and typing assignments will be co-ordinated.

TYP 158/Typing
A general review of the keyboard, correspondence, tabulation, manuscripts with the main emphasis on speed development production typing. Where possible the topics in both English and Office Practice will be done with the typewriter thus increasing the actual time spent on the typewriter.

VARITYPING

VAR 144/VariTyping
Course covers complete operation of the VariTyper Machine (justification, tabular copy, leader lines, centering of headings, copyfitting, plotting and composing of forms), ruling by hand, layout and paste-up and operation of the VariTyper Headliner.

WATCHMAKING

WATCH 130/Theory of Watchmaking
Basic tools – care and maintenance. Measurements; English and metric systems; time measuring techniques. Oscillatory motion; the laws of friction; the laws of liquids and lubrication. Introductory hairspring theory. Lathe, its components, basic and advanced lathe operations. Files and filing techniques. Grinding, polishing and burnishing. Drilling and drill preparations. Pin pallet escapement.

WATCH 131/Watchmaking Skills
Maintenance of basic tools. Development of manual dexterity through project work. Graver sharpening and basic turning. Filing, drilling, grinding and polishing techniques. Pivoting, bushing, refinishing balance staffs of clocks and metres. Fitting clock hairsprings. Making pivots and pallet pins. Turning with accessories.

WATCH 132/Theory of Watchmaking
Clock construction; clock escapements, gearing, striking and chiming mechanisms, pendulum theory. Balance and hairspring theory (intermediate).

WATCH 133/Watchmaking Skills
Balance staff turning. General clock repair. Preliminary watch work; balance staking, poising and truing; hairspring colleting, truing vibrating and overcoiling (intermediate). Fitting regulator pins, booths, mainspring ends, barrel hook, hour wheel tubes, crystals. Bracelet fitting and repairing.

WATCH 230/Theory of Watchmaking
Theory of oscillatory motion, escapements, balance and hairspring theory, friction and lubrication. Watch jewels; production and function in the watch.

WATCH 231/Watchmaking Skills
Escapement matching, balance truing and poising. Colleting, truing vibrating and overcoiling wrist watch hairsprings. Bezel set and friction jewelling. Watch overhaul and lubrication.

WATCH 232/Theory of Watchmaking
Gearing theory, power supply and winding and setting mechanisms. Watch construction; cases, dials, hands, crowns and crystals. Watch regulators. Watch adjustments to mean time, position and isochronism. Calibre identification, material systems, shock proof devices. Influence of magnetism. Waterproofing and waterproof testing. Estimating repairs. Automatic and calendar watches; construction and principles of operation.

WATCH 233/Watchmaking Skills
Practical watch adjustments to mean time, position and isochronism. Fitting stems and crowns, mainsprings, staffs and hairsprings. Waterproofing and testing. Repairs to winding and setting mechanisms, dial train and power unit. General repair of standard, automatic and calendar watches.

WATCH 330/Theory of Watchmaking
Theory of watch design. Calibre analyses. Perpetual calendars. Novelty clock design. Stop watches and chronographs. Minute and quarter repeaters.

WATCH 331/Watchmaking Skills
Analyses of modern watches through disassembly and repair. Repair of complicated watches; timers, chronographs, complete phase calendars. Analyses and repair of unusual time pieces.

WATCH 332/Theory of Watchmaking
Theory of electro-mechanical watches and clocks. Electrical winding systems. Free pendulum clocks; design and performance. Electronic clocks and watches. Coil and magnet designs. Indexing systems, power supply systems. Quartz crystal oscillators.

WATCH 333/Watchmaking Skills
Disassembly, repair and adjustment of electro-mechanical clocks and watches. Repair and adjustment of free pendulum clocks. Repair and adjustment of electro-mechanical pendulum clocks. Servicing of electronic clocks and watches. Analyses of quartz crystal oscillators.

WELDING

WELD 10/Welding
Personal safety precautions, safety in handling and using oxy-acetylene equipment, welding terminology, assembly and disassembly of equipment, regulator pressures, flame adjustments, definition of various oxy-acetylene processes, basic weld joints. Practical exercises in fusion welding of mild steel in the flat position and manual torch cutting using oxy-acetylene equipment.

WELD 11/Welding
Arc welding safety precautions, arc welding terminology, care and use of auxiliary welding equipment, basic techniques used in the arc welding of mild steel, explanation of alternating and direct welding current, shielded arc electrodes and metal transfer. Practical arc welding of fillets in the flat and horizontal position with stringer bead and weave techniques using rutile type electrodes.

WELD 20/Welding
Review of Welding 10, construction of cylinders, construction and operation of welding and cutting torches, construction and operation of regulators. Practical exercises in fusion welding and braze welding in the flat and horizontal positions using oxy-acetylene equipment.

Weld 21/Welding
Review of Welding 11, electrode classification and color codes, factors governing the selection and use of arc welding electrodes, polarity, weld faults. Practical arc welding of fillets in the horizontal position with single and multiple pass techniques using iron powder and low hydrogen type electrodes.

WELD 30/Welding
Review of Welding 10 and 20, welding gases, weld faults, edge preparation, distortion, theory of oxy-acetylene cutting, welding and brazing of various metals. Practical exercises in fusion welding and braze welding in the horizontal and vertical positions, manual torch cutting using oxy-acetylene equipment.

WELD 31/Welding
Review of Welding 11 and 21, power sources, arc blow, plate and edge preparation, carbon arc gouging, arc welding procedures used for the welding of various metals. Practical arc welding of fillets in the horizontal and vertical positions using cellulose and low hydrogen type electrodes.

WELD 40/Welding
Review of Welding 10 and 20, welding gases, weld faults, edge preparation, distortion, theory of oxy-acetylene cutting, welding and brazing of various metals, manufacture of oxygen and acetylene, pipe joint preparations, oxy-acetylene welding rod specifications. Practical exercises in fusion welding and braze welding in the horizontal and vertical positions, manual torch cutting using oxy-acetylene equipment, welding of pipe in rolled and horizontal position.

WELD 41/Welding
Review of Welding 11 and 21, power sources, arc blow, plate and edge preparation, welding sequence, carbon arc gouging, expansion and contraction of metals, causes and control of distortion, testing of welds, testing of operators. Practical arc welding of fillets in the horizontal and vertical positions using cellulose and low hydrogen type electrodes, welding of butt joints in the flat and horizontal positions using cellulose and low hydrogen type electrodes.

WELD 51/Welding
Review of Welding 11, electrode classification and color codes, factors governing the selection and use of arc welding electrodes, polarity, weld faults. Practical arc welding of light gauge mild steel using rutile type electrodes.

WELD 61/Welding
Arc welding safety precautions, arc welding terminology, care and use of auxiliary welding equipment, basic technique used in the arc welding of mild steel, shielded arc electrodes and metal transfer, electrode classification, polarity, carbon arc brazing. Practical arc welding of various joints using rutile and cellulose type electrodes on heavy and light gauge mild steel, carbon arc welding on galvanized sheet.

WELD 71/Welding
Arc welding safety precautions, arc welding terminology, care and use of auxiliary welding equipment, basic techniques used in the arc welding of mild steel, shielded arc electrodes and metal transfer, electrode classification, selection and use of arc welding electrodes, explanation of alternating and direct welding current, polarity, power sources, arc blow, edge preparation. Practical arc welding of fillets in the flat, horizontal and vertical positions using cellulose type electrodes.

WELD 100/Pipe Welding Processes
Theory: Further study of oxy-acetylene, electric arc, tungsten inert gas and gas metal arc welding and their applications to pipe welding. Industrial and transmission specifications. Electrode specifications. Power sources. Use of special equipment. Pipe preparation, preheating and postheating, purging procedures, welding procedures, welding techniques on carbon steel, stainless steel and aluminum pipe. Weld testing, codes.

Practice: Introductory all-position butt and fillet welds on mild steel, using oxy-acetylene, electric arc, tungsten inert gas, and gas metal arc processes. Use of bevelling machines for pipes preparation. Electric arc welding on schedule 40 and 80 carbon steel pipe using cellulose and low-hydrogen electrodes. Uphill and downhill welding. Oxy-acetylene welding of pipe up to and including 4" diameter in all positions, tungsten inert gas welding of carbon steel pipe in all positions, gas metal arc welding of schedule 40 pipe using the uphill and downhill techniques. Weld testing.

WELD 101/Tungsten Inert Gas Welding

Theory: Description, characteristics, applications, safety. Power sources, auxiliary controls, coolants, torches, flowmeters, shielding gases, gas cups. Tungsten electrodes, filler rods. Joint design, metal preparation. Welding techniques for various types of metals in all positions, purging procedures, operation difficulties. Weld testing.

Practice: Welding carbon steels, stainless steels, and aluminum alloy, in all positions; using edge, corner, tee, lap, and butt joint preparations. Welding various joints in stainless and aluminum tubing. Weld testing.

WELD 102/Semi-Automatic and Automatic Welding Processes

Theory: Theory and operation of metal inert gas welding, CO_2 short circuiting, CO_2 fluxed core wire, open arc and submerged arc. Theory of resistance welding and semi-automatic and automatic applications. Power sources and auxiliary equipment. Selection of filler wire and shielding gases. Metal preparation and joint design. Purging procedures, welding techniques, correction of operating difficulties and maintenance. Weld testing.
Practice: Metal inert gas welding of aluminum in all positions. CO_2 short circuiting welding of carbon steels in all positions. Argon-oxygen welding of stainless steels in all positions. CO_2 fluxed core wire and open arc welding of carbon steels in the flat and horizontal positions. Semi-automatic submerged arc welding of carbon steels in the flat and horizontal positions. Weld testing.

WELD 103/Industrial Welding Applications and Shop Procedures

Theory: Theory and operation of fabrication processes including tools and equipment, measuring and layout, cutting, bending, grinding, punching, and drilling; use and design of jigs and fixtures. Theory of various welding applications including resistance, submerged arc, electroslag, thermit, atomic hydrogen, plasma arc, electric arc, oxy-fuel gas welding and cutting. Process and equipment selection. Quality control and codes, weld testing and inspection, estimating, shop and production planning, supervision.

Practice: Shop preparation and welding of assemblies involving the use of structural section, sheet, plate and pipe using electric arc, oxy-acetylene, TIG, and semi-automatic equipment. Setting up welding equipment. Laboratory practice in testing of weld specimens using the following standard destructive and nondestructive methods: tension, hardness, impact, fracture, bend, ultrasonic, magnetic particle, dyepenetrant, macroscopic, visual. Interpretation of radiographs.

WELD 130/Oxy-Acetylene Welding, Brazing and Cutting

Theory: Safety precautions, terminology. Assembly and disassembly of equipment, care of equipment. Types of flames and their uses. Joint design. Weld faults. Repair of castings. Handling of oxygen and acetylene. Testing of welds and operators.
Practice: Fusion welding and braze welding. Cutting with manual and semi-automatic equipment.
One Semester.

WELD 131/Electric Arc Welding

Theory: Safety precautions, terminology. Striking the arc, weld faults. Power sources, auxiliary equipment, care of equipment. Alternating and direct current, polarity, arc blow. Shielded arc electrodes and metal transfer. Electrode classification and color codes, electrode coatings, selection and use of electrodes, storage of electrodes. Plate preparation. Repair of castings, arc cutting and gouging. Testing of welds and operators, codes. Manufacture and uses of ferrous metals. Principal alloying elements. Identification of metals. Heat treatment, distortion.
Practice: Welding of all joints in all positions using various types of electrodes and various thicknesses of metal.
One Semester.

WELD 140/Oxy-Acetylene Welding, Brazing and Cutting

Theory: Safety precautions, terminology. Assembly, disassembly, care and maintenance of equipment; construction and operation of welding and cutting equipment. Types of flames and their uses. Principals of cutting. Manufacture, storage and handling of oxygen, acetylene and other welding gases. Joint design. Fusion welding and braze welding techniques used on various metals. Weld faults, repair of castings. Testing of welds and operators, codes.
Practice: Fusion welding and braze welding of all joints in all positions. Silver brazing on ferrous and nonferrous metals. Fusion welding of small diameter pipe, repair of castings. Cutting with manual and semi-automatic equipment.
Two Semesters.

WELD 141/Electric Arc Welding

Theory: Safety precautions, terminology. Striking the arc, welding techniques and procedures. Weld faults (causes and control). Power sources, auxiliary equipment, care and maintenance of equipment. Alternating and direct current, polarity, arc blow (causes and control). Shielded arc electrodes and metal transfer. Electrode classification and color codes, analyses of electrode coatings, factors governing the selection and application of electrodes, storage of electrodes. Plate preparation and joint design. Arc welding techniques for various metals, repair of castings, arc cutting and gouging, carbon arc welding and brazing. Testing of welds, testing of operators, codes.
Practice: Welding of all joints in all positions using various sizes and types of electrodes and various thicknesses of metal. Repair of castings, carbon arc gouging.
Two Semesters.

WELD 142/Fabrication

Theory: Preparation of plate, pipe and structural sections for welding. Welding procedure. Practical project work using pipe, sheet and structural sections fabricated to specification. Manufacture, composition and uses of iron, steel and other ferrous and non-ferrous metals. SAE specifications. Identification of metals. Heat treatment, distortion (causes and control).
Two Semesters.

WELD 143/Inert Gas Welding

Theory: Description, safety precautions, welding equipment, welding techniques.
Practice: Welding on carbon steel sheet, aluminum, stainless steel, using the tungsten inert gas process and practice welding with semi-automatic equipment using steel and aluminum filler wire.
Two Semesters.

WELD 144/Pipe Welding

Theory: Power sources, electrode specifications, pipe preparation, welding techniques.
Practice: Welding, using oxy-acetylene and electric arc processes.
Two Semesters.

WELD 145/Welding

Personal safety precautions, welding terminology, safety in handling and using oxy-acetylene equipment, assembly and disassembly of oxy-acetylene equipment, regulator pressures, flame adjustments, construction of cylinders, construction of operation of regulators, construction and operation of welding and cutting torches, definitions of various oxy-acetylene processes, basic weld joints. Demonstrations of oxy-acetylene welding and brazing using various types of filler alloys. Practical exercises in fusion welding of mild steel in the flat position using oxy-acetylene equipment.

WELD 146/Welding

Personal safety precautions, welding terminology, care and use of arc welding equipment, explanation of alternating and direct welding current, polarity, arc blow, shielding arc electrodes and metal transfer, electrode classification and color codes, factors governing the selection and use of electrodes, weld faults, testing of welds, causes and control of distortion. Demonstrations of electric arc welding and inert gas welding (TIG). Practical arc welding of fillets in the flat and horizontal positions with stringer bead and weave techniques using rutile type electrodes.